Northeast Water Solutions, Inc.

November 14, 2022

Mr. Douglas Paine, Drinking Water Program
Massachusetts Department of Environmental Management
436 Dwight Street
Springfield, MA 01103

RE: Enforcement Document 00013199
Housatonic Water Works Co. PWS ID#1113003
Evaluation of Water Storage Standpipe Level Upon Water Age & DBPs

Submitted Via Email: douglas.paine@mass.gov

Dear Mr. Paine:

Enclosed with this letter please find the report titled: "*Evaluation of Reducing Water Age by Lowering Storage Tank Water Level, as a Short-Term Means of Reducing DBPs for Housatonic Water Works Company*", prepared in response to Condition 8.A presented in ACO 00013199. Also attached with this submittal is the Water Distribution System Modeling Report prepared by Lenard Engineering and referenced in this evaluation. This evaluation was principally prepared by Water Compliance Solutions, LLC, with review and updates from NWSI, based upon the findings of the recently conducted pilot plant program (manganese treatment pilot plant).

The evaluation concluded: "*Based on the evaluation, lowering the water level in the 1.1-MG storage tank further than the current practice can decrease water age, however, it will adversely impact of the water pressure for certain areas in the distribution system especially during fire flow conditions*".

HWWC is continuing work on an evaluation of the causes of HAA5 MCL violation and the treatment alternatives to prevent future HAA5 MCL violations in the water distribution system. As required, this subsequent evaluation report will be submitted to MassDEP within 120-days of the effective date (10/4/2022) of the Administrative Consent Order.

Following your review, please advise of any questions or comments.

Sincerely,

Robert F. Ferrari, PE
President
Northeast Water Solutions, Inc.

cc: Jim Mercer – HWWC
R. Gullick – WCS, LLC
Deidre Doherty - MassDEP

Evaluation of Reducing Water Age By Lowering Storage Tank Water Level as a Short-Term Means of Reducing DBPs For the Housatonic Water Works Company
November 3, 2022

Part 8A of the Administrative Consent Order (ACO) between HWWC and MassDEP, effective on October 4, 2022, requires HWWC to *"provide the results of an evaluation of reducing water age by lowering levels within its water storage tank as a short-term means of reducing disinfection byproducts"* (DBPs). Chlorinated DBPs include trihalomethanes (THMs) and haloacetic acids (HAAs).

Reducing the water age directly decreases the time that chlorine can act with natural organic material to form DBPs. As such, lowering the water age correspondingly decreases the achieved "*CT*" for calculating disinfection performance, where *CT* is equal to the chlorine residual concentration (*C*) multiplied by chlorine contact time (*T*). Lowering either *C* or *T* to decrease *CT* would typically reduce the formation of chlorinated DBPs prior to entering the distribution system.

HWWC appreciates MassDEP's recognition of the contribution of chlorine contact time to the formation of DBPs. HWWC evaluated the potential impacts to the PWS of reducing the storage tank water levels and determined the following:

First, the 1.1-MG storage tank maintains the hydraulic pressure in the system, and pressures at high elevations are already reportedly too low. Second, the kinetics of the formation of DBPs is not linear over time, and more DBPs are formed in earlier time than later. Therefore, while reducing the storage tank level by a few feet would have some impact on water age, that would be expected to have minimal impact on the formation of DBPs.

<u>Impact on Pressure</u>:

Maintaining adequate pressure and fire hydrant flows is extremely important for water distribution systems. The existing HWWC system operates as a single pressure zone, with system pressures regulated by the water level in the 1.1-MG concrete storage tank located at the Long Pond treatment plant. This tank has an overflow elevation of 960 feet above sea level. The maximum level in the storage tank is ~41 feet, and averages ~35 feet during peak hourly flow. One foot of water head corresponds to 0.433 psi of pressure (and 1 psi = 2.31 feet of water). Therefore, every one-foot decrease in water elevation in the storage tank results in a 0.433 psi decrease in pressure throughout the system.

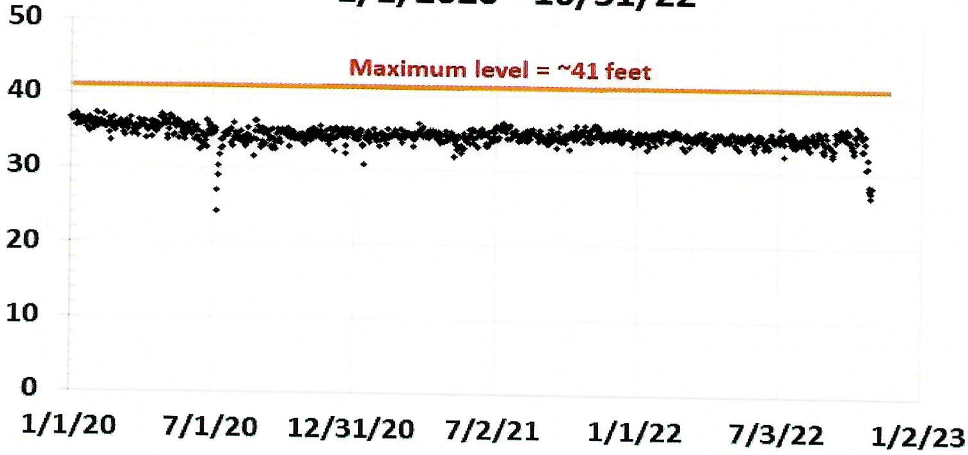
Elevations within the HWW system range from approximately 700 to 865 feet, a difference of 165 feet, and this corresponds to a static pressure range during average daily demand conditions of between ~41 and ~110 psi when the storage tank is full, and the minimum pressure in the system for the average tank level of 35 feet is ~38.5 psi. (Note: these values are "static" pressures and do not include dynamic losses under demand conditions). MassDEP drinking water regulations require a minimum of 35 psi under normal conditions and HWWC meets that by just a few psi at the highest point in the distribution system, which is on Prospect Street at ~865 feet elevation.

Lenard Engineering, Inc. (LEI) conducted a field and modeling study of the HWWC water distribution system in 2022 to identify any potential issues with low pressure or low fire-fighting flows, and to propose appropriate solutions as needed. That report was previously provided to MassDEP . The LEI study concluded that during hydrant usage in the system, pressures at the higher elevations in the system such as Prospect Street are expected to be below 20 psi and on some occasions the pressure would be negative (thus creating a vacuum). The MassDEP requirement to maintain pressure of at least 20 psi at all locations during fire flows would not be met.

If the water level was decreased from an average of 35 feet down to 30 feet, that five-foot difference in elevation would decrease water pressure by ~2.2 psi. Lowering the average water level by 10 feet down to 25 feet would reduce pressure by ~4.5 psi. Given the minimum static pressure in the distribution system of ~38.5 psi (at an average tank water level of 35 feet) is already very close to the minimum required water pressure of 35 psi. HWWC believes the storage tank has already been operated at its reduced level to not maximize water age.

In summary, while pressures throughout the system are satisfactory during normal operation, during high-flow situations such as fire-fighting it is expected that higher elevations in the distribution system will experience pressures lower than the minimum requirement of 20 psi and could even experience negative pressures (a vacuum). Given this situation, all of the pressure provided by the storage tank is considered essential for this system. For reference, water levels in the storage tank for the period of January 1, 2019 to March 31, 2022 are shown in Figure 1 below.

Figure 1. Storage Tank level (feet)
1/1/2020 - 10/31/22



Impact on Water Age (and on *CT*):

There are three major components of the water system to consider when evaluating water age and chlorine contact time: the chlorine contact basin (clearwell), the 1.1-MG storage tank, and the distribution system. The existing HWWC water distribution system consists of approximately 103,000 feet of water mains ranging from 2-inch to 12-inch in diameter. Pipeline materials consist of ductile iron, cast iron, asbestos cement, and PVC piping.

The total volume in the chlorine contact basin is ~136,256 gallons, and the total volume in the distribution system pipes is ~215,000 gallons (Table 1). The chlorine contact basin averages a water level of 9.4 feet (out of a maximum 13.85 feet), and the storage tank averages a water level of 35 feet (out of a maximum of 41 feet). Using the average water levels, on average the contact tank contains 92,477 gallons, and the storage tank contains 882,210 gallons.

Table 1. Volume and average water age for the different system components

System component	Total Water Volume (gal)	Average Water Volume (gal)	Water age (days) using avg. volume and avg. flow of 107,000 gpd
Chlorine contact basin	136,256	92,477	0.86
Storage tank	1,100,000	882,210	8.24
Distribution system	215,000	215,000	2.01
TOTALS =	**1,451,256**	**1,189,617**	**11.12**

The average water age is ~8.2 days in the storage tank, and ~0.9 days in the contact basin, for a total of ~9.1 days. The distribution system adds on average another 2.0 days of chlorine contact time after the point of entry (POE) to the distribution system (right after the tank), for an average total water age of over 11 days. To evaluate the impact of lowering storage tank water level on water age (and DBP formation), water age was calculated for different levels of the water in the storage tank and for different flow rates through the tank (75 and 125 gpm). Table 2 presents results when considering the contact basin and storage tank (), and Table 3 considers both of those units plus the distribution system's water age. Both cases start with a water level of 35 feet in the storage tank, which was the average level in 2022 for both peak hourly flow and all time. The average daily flow rate of 75 gpm is the more appropriate flow rate to consider, as the 125 gpm flow rate is the average peak hourly flow rate. Overall, water passes through the storage tank at the average flow rate and not at the peak hourly flow rate, especially with water ages on the order of several days.

As shown in Table 2, for the case with 75-gpm flow out of the tank, the total water age (chlorine contact time) in the contact basin plus storage tank would decrease from 8.6 days for a 35-foot level down to 7.4 days for 30 feet and 6.2 days for 25 feet. That corresponds to percent decreases of ~13% and ~27%, respectively. For the case of 125-gpm flow, the contact times are of course lower but there were similar percentage decreases when lowering the tank water level (Table 2).

Table 2. Calculated water age for various storage tank levels (treatment plant only)

flow out of tank (gpm) =		75	125	75	125
tank level (ft)	psi decrease from 35 ft	water age (days)		% water age decrease	
35	NA	8.6	5.3	NA	NA
30	2.2	7.4	4.6	13.6%	13.2%
25	4.3	6.2	3.9	27.2%	26.4%

Table 3 presents similar calculations but also includes the distribution system water age. The magnitude of the decreases in water age for lower tank levels are the same as for without the distribution system, but the percent decrease in total water age is less when considering the distribution system.

Table 3. Calculated water age for various storage tank levels (including distribution system)

flow out of tank (gpm) =		75	125	75	125
tank level (ft)	psi decrease from 35 ft	water age (days)		% water age decrease	
35	NA	10.6	7.3	NA	NA
30	2.2	9.4	6.6	11.0%	9.6%
25	4.3	8.2	5.9	22.1%	19.2%

Figure 2, below, provides an example of the typical non-linear formation of trihalomethane DBPs over time (these are not HWWC data). The concentration curve flattens as time progresses, and thus incremental increases of THMs over time continue to get smaller. It is not surprising to find half of the THMs for a water system to have formed within the first day or two of contact time. So, while saving 25% of reaction time in the first day or two may be very helpful, it is not necessarily much help when water age is substantially longer.

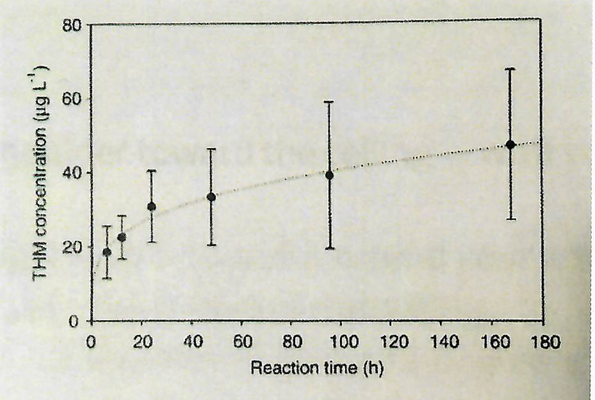


Fig. 1. THM formation curves (temp: 15–25 °C; pH: 6.5–8.5; Br^-: 10–310 μg L^{-1}; Cl_2/DOC: 0.5–3): $TTHM = 12.2t^{0.261}$ ($r^2 = 0.975$; $p = 0.0002$).

Figure 2. Typical pattern of THM formation over time

Source: H.C. Hong, et al., *Science of the Total Environment*, 385 (2007), 45-54.

In the HWWC case, even if the tank water level is decreased from 35 feet to 25 feet, the total water age would only decrease from ~10.6 days (~8.6 days at the POE) to ~8.2 days (~6.2 days at the POE). Given the nonlinear nature of DBP formation over time, that difference would be expected to have only a minor impact on DBP formation.

The highest haloacetic acid (HAA5) result to date was 100 μg/L in August 2021. Meeting a target of 60 μg/L for that sample would require a reduction of 40% in the HAA5 level. That is much greater than any impact upon HAA formation that could be expected due to lowering the water level in the water storage tank.

It should be noted that after an initial period of HAA formation, the concentration of HAAs may actually decrease in the distribution system due to biodegradation of the chemicals. This effect is most often observed during warmer summer temperatures and at further distances out in a distribution system (allowing more opportunity for biodegradation). Of the four annual quarters, HAAs are typically lowest for HWWC during the summer (August sampling).

Conclusions:

Based on the evaluation, lowering the water level in the 1.1-MG storage tank further than the current practice can decrease water age, however, it will adversely impact of the water pressure for certain areas in the distribution system especially during fire flow conditions.

HWWC is currently working on an evaluation of the causes of HAA5 MCL violation and the treatment alternatives in preventing future HAA5 MCL violations in the water distribution system. The report will be submitted to MassDEP within 120-days of the effective date (10/4/2022) of the Administrative Consent Order.

Water Distribution System Modeling Report

Housatonic Water Works Company

April 2022

Prepared for:

Housatonic Water Works Company
Great Barrington, Massachusetts

LENARD ENGINEERING INC.
CIVIL, ENVIRONMENTAL AND HYDROGEOLOGICAL CONSULTANTS
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LIST OF ATTACHMENTS

LIST OF MAPS AND FIGURES

LIST OF TABLES

HOUSATONIC WATER WORKS
WATER SYSTEM MODELING REPORT

EXECUTIVE SUMMARY

Lenard Engineering, Inc. (LEI) constructed a water distribution system model of the Housatonic Water Works (HWW) system, and evaluated the impact of various water main and water storage tank improvement options on available fireflows.

The primary focus of this report was to identify options that would increase available fireflows to the main core (Housatonic Village) of the water distribution system. Secondarily, the report evaluated the impacts of other distribution system improvements on locations throughout the distribution system.

As discussed in this report, LEI recommends HWW construct a new 200,000 gallon minimum volume elevated water storage tank on High Street, which would improve fireflows from the current 650 gpm to over 1,000 gpm, while at the same time stabilizing pressures at the system's higher elevations in the system during fireflow events.

I. INTRODUCTION

Maintaining adequate pressure and fire hydrant flows is important for water distribution systems. Lenard Engineering, Inc. (LEI) conducted a modeling study of the Housatonic Water Works Company (HWW) water distribution system to help identify any potential issues with low pressure or low fire-fighting flows, and to propose appropriate solutions as needed.

The HWW system operates as a single pressure zone, with system pressures regulated by the water level in the 1.0 MG concrete water storage tank located at the Long Pond treatment plant. This tank has an overflow elevation of 960 feet above sea level.

The existing HWW water distribution system consists of approximately 103,000 feet of water mains ranging from 2" to 12" in diameter. Piping materials consist of ductile iron, cast iron, asbestos cement, and PVC piping.

Water service elevations within the HWW system range from approximately 700 – 865 feet, a difference of 165 feet. This corresponds to a static pressure range during average daily demand conditions of between ~40 and ~110 psi. The highest location within the HWW system and thus lowest static pressure is located on Prospect Street at approximately 865 feet elevation.

II. GOALS

Pressure: Massachusetts drinking water regulations require a minimum of 35 psi water pressure at all locations during normal conditions, which is met in the HWWC system with a minimum pressure of 40 psi. The regulations also require a minimum 20 psi pressure during all conditions including fire flow. That is expected to be maintained at most locations within the HWW system during fire flow except for the most elevated locations such as Prospect Street.

Available fire flows: The Insurance Service Office (ISO) provides recommendations for needed fire flow for various types of structures and uses. For single-family residential areas, the typical needed fire flow is between 500 – 750 gpm, while maintaining 20 psi at all system locations. For commercial and industrial zoned areas, needed fire flows of 1,000 gpm or more are generally recommended, which varies by building use, construction materials, and proximity to adjacent structures.

III. MODEL DATA INPUT

A) Mapping- LEI utilized the June 2017 Tighe & Bond map to generate a hydraulic model using the WaterCAD software program. This map was reviewed for accuracy by HWW, and several more recent pipe improvements were added.

B) Water Demands - HWW provided updated water production records from the Long Pond slow sand filtration plant, which provided an average daily demand value of **0.11 MGD**, and a maximum daily demand value of **0.23 MGD**, which occurred during hydrant flushing.

LEI utilized a value of **0.15 MGD**, approximately 140 % of the average daily demand, to simulate peak daily demand conditions in our model, during non-flushing periods.

IV.. HYDRANT FLOW TESTING AND MODEL CALIBRATION

HWW conducted ten fireflow tests within the distribution system, to provide updated pressures and flows for model calibration purposes. **Figure 1** shows the flow test locations, taken throughout the system. Copies of the flow test results are provided in **Attachment A.**

Table A compares field flow and pressure results to those predicted by the model. The model was calibrated under both static conditions (no hydrants flowing), as well as dynamic conditions (with hydrants flowing). Good calibration is typically defined as the majority of the model predicted values being within 10 psi of observed field conditions. These are shown highlighted in yellow. The model had good calibration for 9 out of 10 locations for static conditions, and 7 out of 10 locations during dynamic conditions.

Several key observations during model calibration:

- 1) The Hazen-Williams "C" factor for water mains measures the relative roughness of the piping. The "C" factors throughout the HWW system were surprisingly higher (smoother) than expected for pipes approaching 100 years in age. Whereas older piping C values typically range from C=30 to C= 60, the model calibrated reasonably well assigning a C = 100 to the majority of the pipes. Note that brand new ductile iron piping is assigned a C factor of C = 140.

  A "C" factor of 100 is indicative of pipes with little or no buildup, which confirms HWW observations of smooth piping in good condition made during main tapping and repairs.

2) The model calibrates very well for Flow Test # 1 on North Plain Road. This location is critical, as this is reflective of the long 7,300 feet of 10" and 12" water main between the plant and the first customer. As all the water passes through this piping, getting this pipe accurately modeled is critical.

3) Flow tests # 5 and # 6, Front Street and Pleasant Street- also had good calibrations. This area – Front Street and Pleasant Street (Node J-50), will be used to compare the impacts of various system improvements on available fireflow in Housatonic Village.

4) The calibrated model predicted that negative pressures are occurring during fire flow conditions at local high point on Prospect Street (Node J-73). Maintaining positive pressures at all system locations, especially at the systems high points, is critical. Predictions of pressures at this high point during various system improvement options are shown in the tables.

High point pressures on Prospect Street should be monitored during future hydrant flow testing, to help confirm residual pressures at this critical location.

5) The three locations that fell outside the 10 psi calibration threshold are at system dead ends, which do not impact the calibration of the remainder of the modeling.

IV. POTENTIAL SYSTEM IMPROVEMENTS

LEI evaluated the impact of eliminating several smaller water mains, which could increase available flows and fireflows to the system. These potential improvements are shown on **Figure 2**, and included:

- Improvement # 1- Replacing 2,700 feet of 6" asbestos cement (AC) main on Van Deusenville Road with new 12" ductile iron (DI) piping. 12" piping was chosen, as it will connect a 10" main coming from the Water Treatment Plant, to a 12" main to the north which extends towards Housatonic Village.

- Improvement # 2- Replacing 5,600 feet of 6" CI main on North Plain Road with new 8" DI piping. An 8" main was chosen, as it continues an 8" main coming from the plant and connects at Crimson Lane.

- Improvement # 3- Replacing 2,400 feet of 4" and 6" CI main on Main Street North with new 8" DI piping.

- Improvement # 4- Replacing 2,100 feet of 6" CI main on Park Street with new 8" DI piping.

- Improvement # 5- Installing 7300 LF of parallel 12" piping between the treatment plant and North Plain Road.

- Improvement # 6- Constructing a 200,000 gallon elevated water storage tank on High Street.

V. WATER MODELING RESULTS

LEI used our model to evaluate alternative solutions to improve available fireflows within the HWW system.

LEI used the recent hydrant flow testing to create a baseline existing condition run, which was used for comparisons with other runs. Then LEI modeled fireflows at five different locations in the system, as shown in **Tables 1-5**. For each option, we simulated peak daily demands of 0.15 MGD, coincident with fire flow conditions, and evaluated residual pressures at the highest elevation in the system on Prospect Street (Node J-73).

LEI simulated fireflows of 750 gpm in residential areas, as this is the typical available fireflow required by the Insurance Service Office (ISO) to be provided in residentially zoned areas, while maintaining 20 psi residual pressure in all remaining locations.

ISO recommends higher available flows in commercial and industrial locations, and LEI plugged in flows as high as 1,500 gpm to evaluate their impacts.

A) IMPACTS OF PIPELINE IMPROVEMENTS ON FIRE FLOWS AT FRONT ST. (Node J-50)

Table 1 provides a summary of our modeling results of the existing conditions, and various pipe upgrades to improve fire flows on Front Street near the intersection of Pleasant Street.

Current Conditions: The model indicates that during a fire flow of 750 gpm the upstream node would drop in pressure from 91 psi to 49 psi and the pressure on Prospect St. would drop from 40 psi to -3 psi.

With Improvement Options 1, 2 and 3 In Place: LEI evaluated each of the piping improvements on Van Deusenville Road, North Plain Road, and on Main Street North, to see what impacts they have by themselves and in combination, on increasing available fireflows. As shown in **Table 1**, fireflows can be increased marginally, from 750 to 1000 gpm, but negative pressures will still occur at the system high point on Prospect Street.

B) IMPACTS OF PIPELINE IMPROVEMENTS ON FIRE FLOWS AT SPRUCE ST. (Node J-34)

Table 2 provides a summary of our modeling results of the existing conditions, and pipe upgrades to improve fire flows on Park Street, near the intersection of Spruce Street (Node J-34). .

Current Conditions: The model indicates that during a fire flow of 440 gpm the upstream node would drop in pressure from 93 psi to 63 psi and the pressure on Prospect Street would drop from 40 psi to 29 psi.

The model predicts that during a fire flow of 750 gpm the upstream node would drop in pressure from 93 psi to 13 psi and the pressure on Prospect Street would drop from 40 psi to 14 psi.

- **With Option 4 Improvements In Place:** Option 4 includes replacing approximately **2,100 feet** of undersized existing 6" water main with new 8" water main on Park Street. At a simulated fire flow of 750 gpm, with this improvement in place, residual pressures increase from 13 psi to 58 psi. The residual pressure at the Prospect Street high point would remain at 14 psi.

C. IMPACTS OF PIPELINE IMPROVEMENTS ON FIRE FLOWS AT NORTH PLAIN ROAD (Node J-124)

Table 3 provides a summary of our modeling results of the existing conditions, and pipe upgrades to improve fire flows on North Plain Road near Linda Street.

Current Conditions: The model indicates that during a fire flow of 380 gpm the upstream node would drop in pressure from 82 psi to 59 psi and the pressure on Prospect Street. would drop from 40 psi to 25 psi.

The model predicts that during a fire flow of 750 gpm the upstream node would drop in pressure from 82 psi to 7 psi and the pressure on Prospect Street. would drop from 40 psi to -5 psi.

With Option 2 Improvements In Place: Option 2 replaces approximately **5,600 feet** of undersized existing 6" water main with new 8" water main on North Plain Rd. With Option 2 improvements in place, at 750 gpm the residual pressure increases significantly, from **7 psi** to **43 psi.**

With this improvement in place, the pressure on the end of the line on Great Barrington Rd. is predicted to drop from 68 psi to 7 psi.

D. IMPACTS OF 7,300 LF OF PARALLEL 12" WATER MAIN FROM WATER TREATMENT PLANT TO NORTH PLAIN ROAD

Table 4 evaluates the impacts of installing a parallel 12" water main from the treatment plant to North Plain Road, in combination with the existing 10" and 12" main. The impacts generally improve pressures systemwide by approximately 16 psi, as this parallel pipe eliminates that amount of head loss, prior to branching off into the system.

Note that in the Housatonic Village area, residual pressures during fireflows at Front Street (Node J-50) are better, but slightly sub-standard pressures at the Pleasant Street high point (Node J- 73) still exist (13 psi at 750 gpm, and -4 psi at 1000 gpm).

E. IMPACTS OF PROPOSED 200,000 GALLON ELEVATED STORAGE TANK AND PIPELINE IMPROVEMENTS ON FIRE FLOWS AT FRONT STREET (Node J-50)

Table 5 provides a summary of our modeling results of the existing conditions, adding a 200,000 gallon water tank to improve fireflows in the core of the water distribution system. LEI chose 200,000 gallon sizing initially to provide two hours of fireflow storage at a rate of 1000 gpm (totaling 120,000 gallons), along with an additional 80,000 gallons reserved to meet typical peak domestic demands.

Current Conditions: The model indicates that during a fire flow of 750 gpm on Front Street the upstream node would drop in pressure from 91 psi to 49 psi, and the pressure on Prospect Street would drop from 40 psi to -2 psi.

Adding New Tank Only: Adding a new 200,000 gallon elevated water storage tank only and using the existing piping will allow full use of the 750 gpm fireflow, while drastically improving the water pressure at the high point in the system (41 psi).

Increased flow to 1,500 gpm would be available at Front Street, but predicted pressures at the high point are 9 psi, below the recommended 20 psi. Conservatively, we estimate an increased fireflow of **1,000 gpm** can be provided, while maintaining greater than 20 psi at all point in the system.

VI. CONCLUSIONS

1) LEI evaluated the impacts of both water distribution piping replacements, as well as adding a new water storage tank on the HWW system. Although pipeline replacement in the system has some positive results, the optimum improvement to enhance fireflows in the core of the system would be to construct a 200,000 gallon elevated water storage tank on High Street.

   This improvement would increase available fireflows to over 1,000 gpm, while maintaining adequate pressures at the systems high point on Prospect Street.

2) The added benefit to providing a tank within the distribution system is that HWW could potentially reduce the amount of water storage required at the Long Pond treatment plant.

   A smaller tank would still meet the chlorine contact time requirements of the Surface Water Treatment Rule, but also reduce water age which could potentially also reduce the concentrations of disinfection by-products (TTHM's and HAA5).

FIGURES

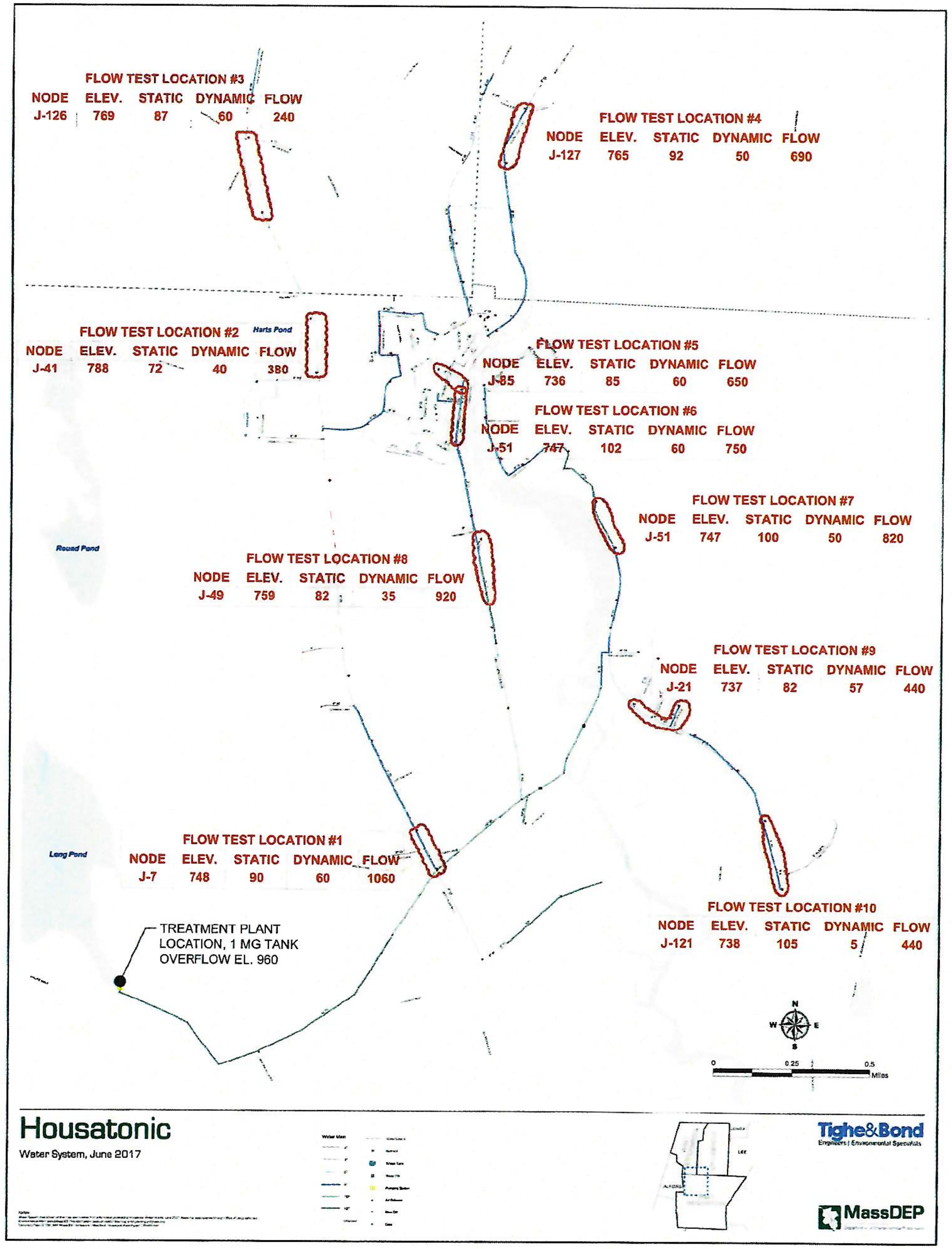


FIGURE 1 - FLOW TEST LOCATION MAP

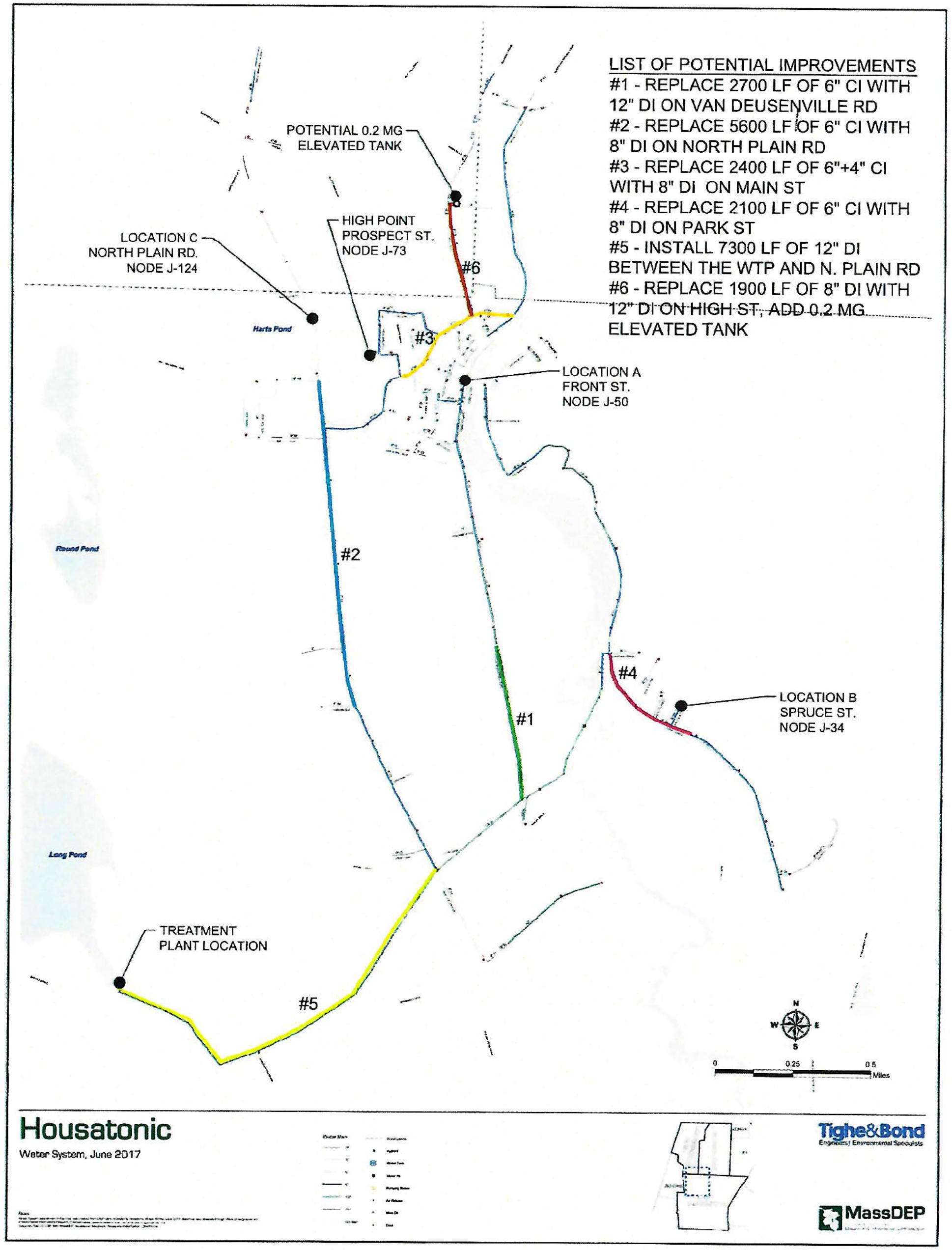
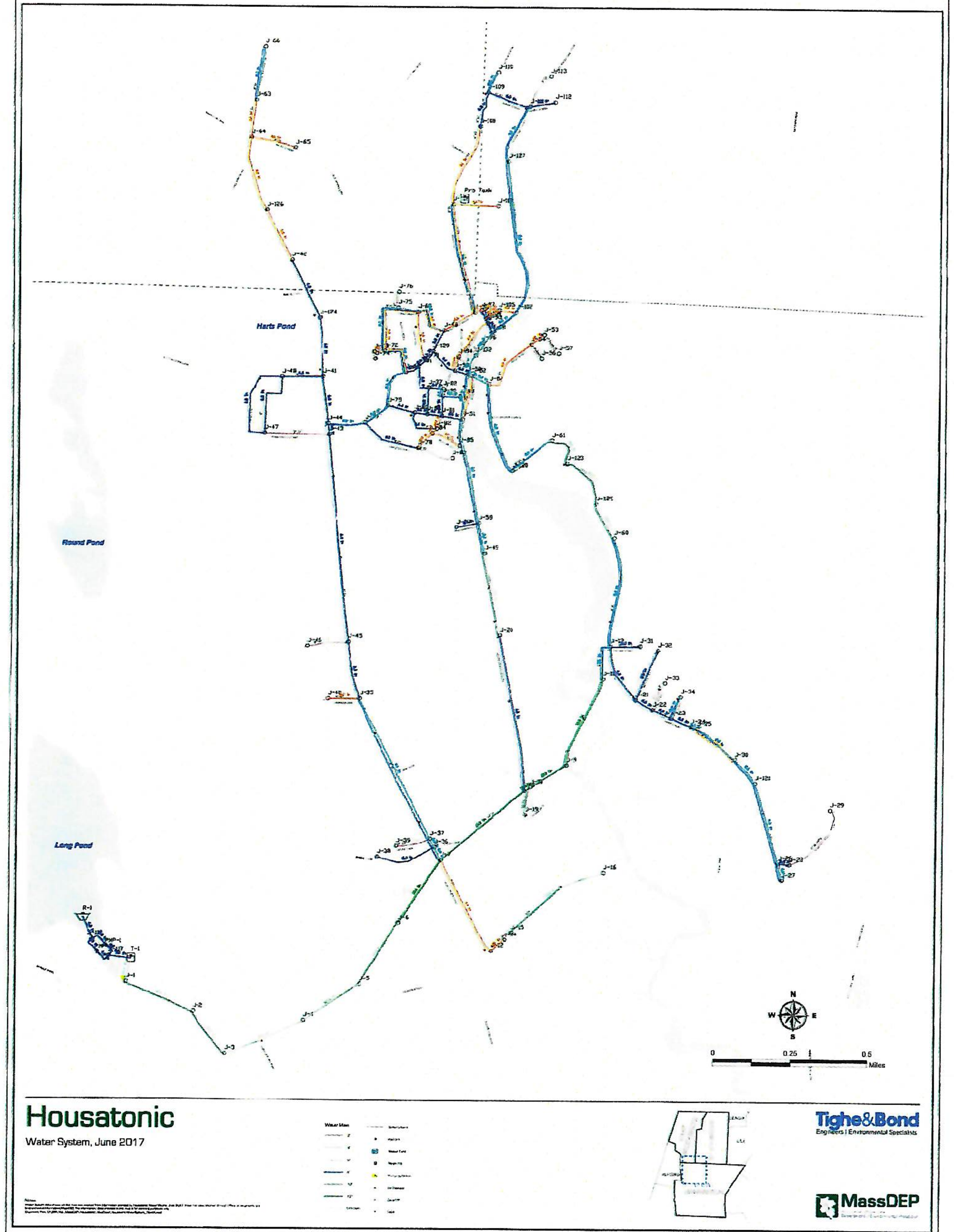


FIGURE 2 - POTENTIAL WATER SYSTEM IMPROVEMENTS

Attachment A - WaterCAD Node Map



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WATERCAD NODE MAP

PREPARED FOR

Housatonic Water Works

Great Barrington, Massachusetts

Drawing date:	March 2, 2022
Drawing Scale:	AS SHOWN
Designed By:	JED
Drawn By:	JED
Checked By:	JEE
CAD File:	BasePipes
Drawing #	1
Job #	21-382

Rev.	Date	Revision	By