



# Chester Water Asset Management Plan

Town of Chester, MA

August 2025

**Tighe&Bond**

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# Section 1 Introduction

## 1.1 Project Background

In February 2023, the Town of Chester (Town) qualified for an asset management plan (AMP) grant for the Department's water system on the 2023 Drinking Water State Revolving Fund's (DWSRF) Draft Intended Use Plan (IUP) by the Clean Water Trust (CWT) and MassDEP. On April 10, 2023 MassDEP published the Final IUP that included the Town of Chester AMP. Tighe & Bond was hired by the Town to complete the following Asset Management Plan. The total approved project cost was \$113,500 with a 60% reimbursement grant (\$68,100), 17% cash match (\$19,295), and 23% in-kind-services match (\$26,150).

## 1.2 Chester Water Department

The Town's water department was established in the 1890's. The water distribution system is made up of 11 miles of water mains in one pressure zone, one water treatment plant, and two surface water sources including Austin Brook and Horn Pond. Both sources are equipped with intake structures, and Austin Brook has a gatehouse and dam. The Town provides water to 252 service connections that serve approximately 700 residents. Table 1-1 is a summary of the Town's vital water distribution system components.

**TABLE 1-1**  
Chester Water System Components

Asset	Capacity/Count
Chester Water Treatment Plant	0.24 MGD
Water Mains	11 miles (active)

Historically, the Chester Water Department (CWD) has taken a reactive approach to operations of the water system. In addition to managing operations at the treatment plant, the department is responsible for maintaining the water system, including the 2 surface water sources, and reacting to any problems that arise. Much of the maintenance needs to be outsourced due to limited staffing and budget. The following is an overview of operations and maintenance activities and systems to support operations used by CWD.

### 1.2.1 Recordkeeping

It is important to keep adequate records of all water system activities. In terms of maintenance activities, keep in mind the concept that "if it isn't written down, it didn't happen".

Almost all water quality data are compiled into a single Excel workbook (not including SCADA data from the water treatment plant). This database should be updated whenever new data is received. This database also includes a record of all key events.

The map of the distribution system should be periodically updated and/or corrected as new information becomes available. These updated maps can be added to the Town's new digital mapping.

### 1.2.2 Water Quality Monitoring

There are three categories of water quality monitoring required for potable water in the distribution system:

1. Revised Total Coliform Rule (RTCR): The RTCR requires monthly sampling at the Town Hall and at the Point of Entry (POE) to the distribution system for total coliform (present/absent), E. coli (present/absent), and chlorine residual. The Coliform Sampling Plan for RTCR compliance is included below, along with a MassDEP fact sheet on complying with the RTCR.

2. Disinfectants/Disinfection Byproducts Rule (D/DBPR): The D/DBPR requires sampling four times per year at two locations:

- 191 Rte. 20/Huntington Road – Chester Village Market
- 381 Rte. 20/ Huntington Road – Wheeler Oil Company
  - Sample the third week of February, May, August, and November
  - Analyze for haloacetic acids (HAA5) and total trihalomethanes (TTHM), including the nine individual chemical species
  - Also measure chlorine residual when sampling for HAAs and THMs
  - At times may want to also simultaneously monitor for THMs and HAAs at the end of the clearwell and at the end of the treatment plant (point of entry)
  - At times may also want to simultaneously monitor for total organic carbon in the raw water, filter effluents, and combined filter effluent or point of entry

3. Lead and Copper Rule (LCR):

Lead and copper monitoring is required once every three years. The most recent monitoring was conducted in the third quarter of 2023, so the next scheduled round is in 2026. The LCR sampling plan includes testing finished water samples from thirteen different taps throughout the distribution system. The thirteen addresses are as follows:

- 7 River Front Street
- 412 Huntington Road
- 17 Main Street
- 10 Hampden Street
- 10 Maple Street
- 23 William Street
- 263 Huntington Road
- 100 Prospect Street
- 128 Prospect Street
- 21 William Street
- 40 Hampden Street
- 8 Emery Street
- 17 Olin Avenue

The specific sampling and reporting requirements for the LCR are relatively complicated and detailed, with many different forms required. A sampling checklist is available from MassDEP at <https://www.mass.gov/doc/lead-and-copper-sampling-checklist/download>, and the various forms are included at <https://www.mass.gov/lists/lead-copper-forms-templates>.

### **1.2.3 Customer Complaints**

Any calls to the town staff related to the drinking water system should be directed to the Town Administrator. The Town Administrator will decide how the call should be handled. At present, calls related to water quality may be referred to the Primary Operator or the water commission who also serve as backup to the operations staff. Billing inquiries should be directed to the same department that handles billing for the Chester Municipal Electric Light Department (CMELD).

A log sheet should be kept for all customer calls by the Town Administrator, including the nature of the inquiry, the caller's name and contact information, and what was done about the call, if anything. These logs are helpful means of having customer contact information should situations arise where customers need to be notified. There is currently no customer wide notification system available in Town apart from the Town Website.

### **1.2.4 Cross Connection Control Program**

The Primary Operator is the Cross Connection Program Manager. According to the 2019 Annual Statistical Report (ASR) completed by the previous Primary Operator, cross connection control is accomplished with a Reduced Pressure Backflow Preventer (RPBP), and not with a Double Check Valve Assembly (DCVA). Also, according to the ASR, there was one municipal facility with a cross-connection control device that was tested twice in 2019, and none for any commercial, industrial, institutional or residential users. The CWD will continue to conduct their cross connection control program year to year.

### **1.2.5 Flushing**

The distribution system pipes should periodically be cleaned by flushing at high velocity to reduce the amount of solids in the pipes. The system should be flushed twice per year, unless results or environmental conditions indicate otherwise. Flushing in a single direction (unidirectional flushing) is preferred so as not to spread dirty water around the system. Water Department staff have kept up with flushing in recent years and should continue to keep record of this in their active GIS system. The Town established a flushing plan in their 2021 O&M – refer to this for more information.

### **1.2.6 Hydrant Inspections and Maintenance**

There are 58 hydrants in the distribution system, based on visual inspection by Water Compliance Solutions, LLC. These hydrants are all identified in Appendix M. The results from the last hydrant tests appear to have been most recently updated on February 19, 2005. It is recommended that the Town inspect and maintain all existing hydrants within the distribution system.

**1.2.7 Valve Exercising**

Many of the valves are quite old and have not been exercised recently. Current water staff have been exercising certain valves in order to determine the size of the valves in specific areas. This task has been mainly taken on by the Water Commission. Additional gate box cleaning and exercising of the valves is necessary.

As the Town continues to operate and exercise valves, especially those that are on the older water mains and are susceptible to failure, it is recommended that an operator training program, valve cleaning program and maintenance program be implemented. Town valves are all identified in Appendix N.

**1.2.8 Leak Detection**

If water flow rates increase unexplainably, then a leak somewhere in the water lines may be the cause. If the location is not readily evident, a driving visual inspection of the roads with water lines should be conducted. If that does not identify the location of the leak, then call the Mass Rural Water Association (MassRWA) for assistance with locating the leak. They may be contacted at:

Mass Rural Water Association  
781 Millers Falls Rd, Northfield, MA 01360  
(413) 498-5779  
<https://massrwa.org/>  
Dave Kaczinski, Executive Director; [dkaczinski@massrwa.org](mailto:dkaczinski@massrwa.org)  
Jon Tibbetts, Circuit Rider; [jtibbetts@massrwa.org](mailto:jtibbetts@massrwa.org); cell 413-834-8975

System wide leak detection under normal operating conditions is also recommended as a preventative maintenance measure.

**1.2.9 Pipe Repair and Disinfection**

Repair of broken pipes must be done in accordance with American Water Works Association (AWWA) standards, including disinfection. Typically, outside contractors are hired to complete pipe repairs. Some options for this work include the following companies. They provide additional services such as pipe and valve locating, leak detection, and valve and hydrant maintenance. The Town has used several outside contractors in the past to complete these repairs.

EJ Prescott  
40 Commercial Street, Pittsfield, MA 01201  
Office: 413-443-3987  
24/7: 800-EJP-24HR  
Fax: 413-443-3876  
<https://www.ejprescott.com>

Double M&T Excavation  
801 Pochassic Rd, Westfield, MA 01085-1570  
Office: 413-568-7133

### 1.3 The Importance of Asset Management

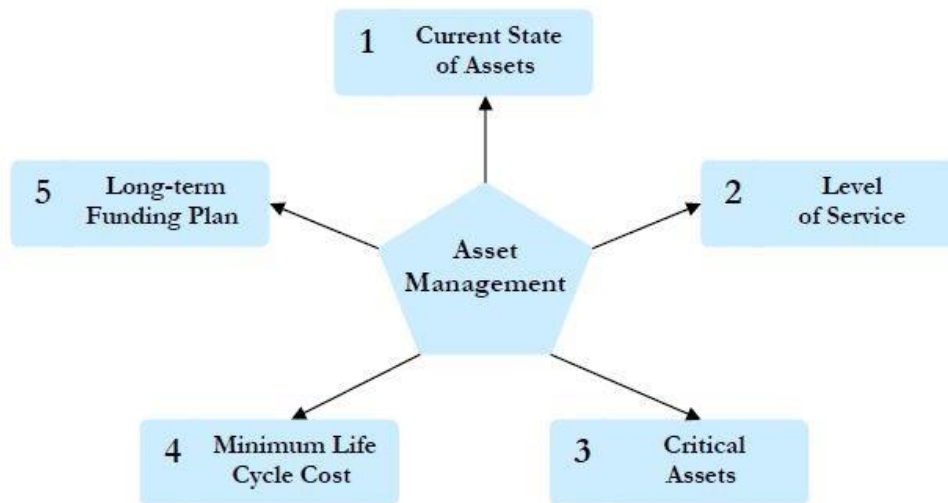
The United States Environmental Protection Agency (USEPA) defines asset management as the “process water and water utilities can use to make sure that planned maintenance can be conducted and capital assets (pumps, motors, pipes, etc.) can be repaired, replaced, or upgraded on time and that there is enough money to pay for it”<sup>1</sup>. Asset management includes the planning, design, construction, operation, maintenance, rehabilitation, and replacement of infrastructure that performs a function for the Town in a cost-effective manner. There are numerous benefits of asset management that include but are not limited to:

- Understanding the Town’s water system assets, desired level of services, and costs associated with operation and maintenance
- Communicating with transparency and demonstrating a responsible investment in infrastructure
- Strategically budgeting and prioritizing infrastructure and system needs
- Optimizing asset life
- Meeting level of service expectations
- Addressing regulatory requirements
- Improving responses to emergencies
- Providing methodologies for determining replacement of existing equipment prior to failure
- Providing Town staff with the necessary tools by acquiring equipment for recording and transfer to new or existing software systems
- Analyzing existing rate structure to determine adequacy of funds for operation

The general process of asset management for water systems is shown in Figure 1-1 and involves defining the following items:

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<sup>1</sup> MassDEP, “Massachusetts Clean Water Trust Asset Management Plan Grant Program, 2019,” April 2008.

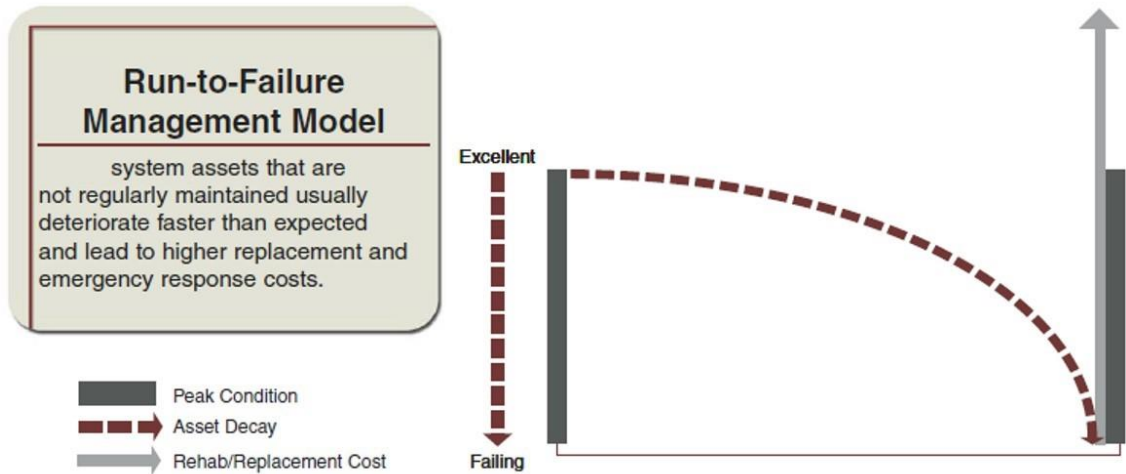
**FIGURE 1-1**

The Five Core Questions for Implementing Asset Management<sup>2</sup>

1. **Current State of Assets:** Inventory the available assets throughout the water system. The inventory list consists of asset location, condition, maintenance history, service life, and value, if possible.
2. **Level of Service:** Determine a system operation that is sustainable by considering water quality, water quantity, system reliability, regulatory requirements, and environmental standards.
3. **Critical Assets:** Assign criticality scores to the assets required for continued sustainable system operation. An asset's risk of failing due to their condition, consequences in the event of failure and cost of repair or replacement in the event of failure may dictate the criticality score.
4. **Minimum Life Cycle Cost:** Analyze existing operation and maintenance (O&M) procedures and activities to determine how they may be optimized based on cost, criticality, and level of service.
5. **Long-Term Funding Plan:** Establish the financial capital necessary to maintain a desired level of service by proactively evaluating rate structure and available funding opportunities.

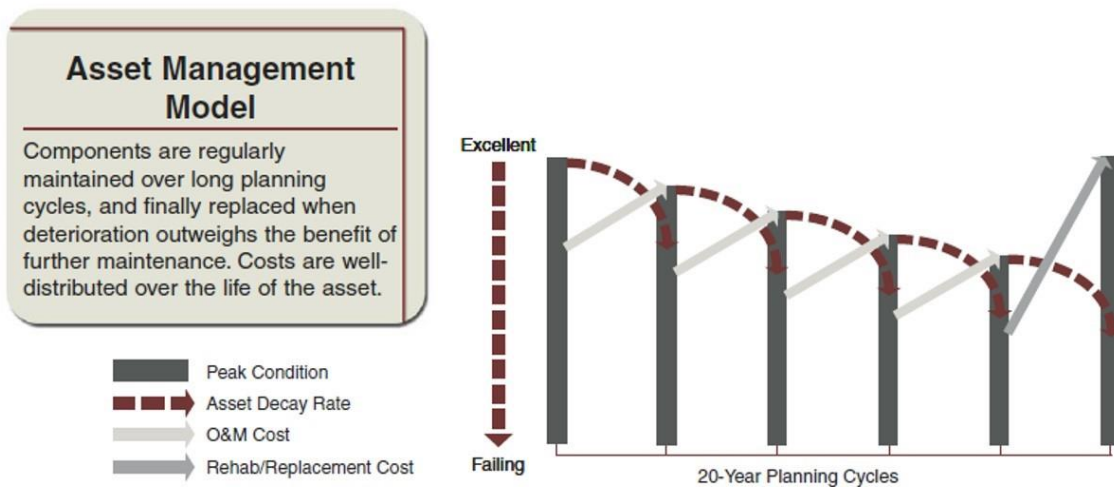
Often communities conduct O&M activities on a reactive basis, with resources allocated to emergency response and rehabilitation or replacement of failed assets. This is classified as a Run-to-Failure Management Model, as shown in Figure 1-2.

<sup>2</sup> U.S EPA, "Asset Management: A Best Practices Guide," April 2008.



**FIGURE 1-2**  
 Run-to-Failure Management Model<sup>3</sup>

Under this model, assets that have not yet failed, are aging, defects are worsening, and future problems are developing. Ultimately, this can lead to higher costs for maintenance and replacement or repair. Alternatively, utilizing an asset management approach, as shown in Figure 1-3, allows aging infrastructure to be maintained and replaced prior to failure. This prevents adverse consequences of failure and distributes costs over the service life of the asset.



**FIGURE 1-3**  
 Asset Management Model<sup>4</sup>

<sup>3</sup> USEPA, "Fact Sheet: Asset Management for Sewer Collection Systems," April 2002.

<sup>4</sup> U.S EPA, "Asset Management: A Best Practices Guide," April 2008.

### 1.3.1 Considerations for the Town of Chester

Town personnel are seeking a more proactive and data-driven decision-making process for their water utility. The relationship between the probability and consequence of failure determines the risk score of an asset, as demonstrated in Figure 1-4. An asset in new condition inherently has a low probability of failure and with a low consequence of failure is considered a low-risk asset. Conversely, an asset that is in poor or failing condition and has a high consequence of failure is considered a critical asset with a high risk. Similarly, an asset with a high consequence of failure, even if it is not likely to fail should be monitored closely and proactively replaced or rehabilitated.



**FIGURE 1-4**

Criticality as the Relationship between Probability of Failure and Consequence of Failure

This Water System Asset Management Plan incorporates risk-based decision making into the existing proactive management style, allowing the Town to continue delivering high quality service with consideration to water rates.

## Section 2

# Asset Inventory and Evaluation of Existing Facilities

### 2.1 Introduction

The water system inventory and evaluation were separated into vertical and horizontal infrastructure. Horizontal assets include the water distribution system piping, while vertical assets comprise the water treatment plant, water sources, and intake structures.

On May 16, 2024, Tighe & Bond met with the Town to conduct a condition assessment of the following locations:

- Austin Brook Reservoir
- The Water Treatment Plant
- Gate House at Austin Brook
- The finished water sample building

Due to the difficulty in access, Horn Pond was not visited at this time, but the Chester Water staff visited and provided photos of the condition of various assets at Horn Pond. During the assessment, Tighe & Bond created an inventory of the system equipment, evaluated the current conditions of the infrastructure, and identified issues and needs. The information collected was used to analyze the probability of failure based on asset age, asset useful life, material, maintenance history, and operational conditions.

### 2.2 Horizontal Asset Inventory

The Town's water distribution system consists of approximately 11 miles of water mains with diameters up to 8 inches constructed of various materials including cast iron, ductile iron, asbestos cement, and copper. Appendices G & H show water system maps that include water main material and installation year, respectively, for the Town's water system pipes. To develop the horizontal asset inventory, Tighe & Bond relied on the following data sources to establish the horizontal inventory:

- Record Drawings
- Data Collection by Town

A complete inventory of the distribution mains including characteristic information is included in Appendix A. The horizontal recommendations developed by Tighe & Bond for each facility are included in Appendix B. Figure 2-1 illustrates the percentage of various pipe materials within the water distribution system. Several distribution system maps showing different water main characteristics are provided in Appendices G through L.

Based on the Lead Service Line (LSL) Survey, the services in the town were found to have the following characteristics.

**TABLE 2-1**

Summary of Known Water Service Line Materials

Known Material	Public Side		Private Side	
	Quantity	Percent	Quantity	Percent
Plastic (PVC)	0	0%	1	0.4%
Plastic (HDPE)	0	0%	2	0.8%
Galvanized	0	0%	3	1.2%
Copper	222	85.7%	123	47.5%
<b>Total</b>	<b>222</b>	<b>85.7%</b>	<b>129</b>	<b>49.8%</b>

**TABLE 2-2**

Summary of Unknown Water Service Line Materials

Unknown Material	Public Side		Private Side	
	Quantity	Percent	Quantity	Percent
Unknown, does not contain lead or galvanized	6	2.3%	8	3.1%
Unknown, may contain lead and/or galvanized	31	12.0%	122	47.1%
<b>Total</b>	<b>37</b>	<b>14.3%</b>	<b>130</b>	<b>50.2%</b>

A full evaluation of these services was not conducted as part of this AMP.

### 2.2.1 Development of the Horizontal Asset Inventory

Through this Asset Management Plan, Tighe & Bond has implemented a Geographic Information System (GIS) online database that includes all the relevant documentation pertaining to the water distribution system. Historical records and knowledge of the system were utilized to update the information. The Chester GIS water system data was used as the basis for the horizontal asset inventory. Each pipe was then assessed for probability of failure and consequence of failure using data from the GIS along with MassGIS data and institutional knowledge from the Chester Water Department.

The GIS includes attribute data for the nearest street, pipe material, size, length, installation year, and corrosivity. The majority of the materials in the system are unknown and measure up to 8" in diameter. Table 2-3 below summarizes the lengths of each pipe by material. Table 2-4 summarizes the total length of each pipe size in the distribution system.

**TABLE 2-3**  
Water Main Length and Material Summary

Material	Length (LF)	Percent of Systems
Asbestos Cement (AC)	6,849	12%
Cast Iron (CI)	5,811	10%
Copper	5,028	9%
Ductile Iron (DI)	35,789	61%
Unknown	4,933	8%
<b>Total</b>	<b>58,410 (~11 miles)</b>	<b>100%</b>

**TABLE 2-4**  
Water Main Length and Size Summary

Size (in)	Length (LF)	Percent of Systems
2 and under	5,028	9%
4	5,139	9%
6	28,167	48%
8	20,076	34%
<b>Total</b>	<b>58,410 (~11 miles)</b>	<b>100%</b>

\*Records show copper mains sized ¾" to 2" serving multiple houses with individual service connections from the cooper

### 2.2.2 Institutional Knowledge Data

In order to incorporate institutional knowledge in the probability of failure analysis, Tighe & Bond engaged in discussions with the Town to gather information regarding what pipe conditions were known, and where recent main breaks occurred and were repaired. After these discussions, pipes were assigned scores based on their condition. Pipes deemed to be in good condition received lower scores, indicating a lower probability of failure. Conversely, pipes in poor condition were assigned higher scores, reflecting an elevated probability of failure. Additionally, pipes that had experienced previous breaks were assigned higher scores as well, considering their history of issues. By incorporating these factors into the analysis, a more comprehensive assessment of the pipes' failure probabilities was calculated. In the future, the Town could collect and incorporate additional institutional knowledge into the AMP such as pipe condition, top customers for sections of line, street paving schedules, and quality complaints to reevaluate horizontal assets.

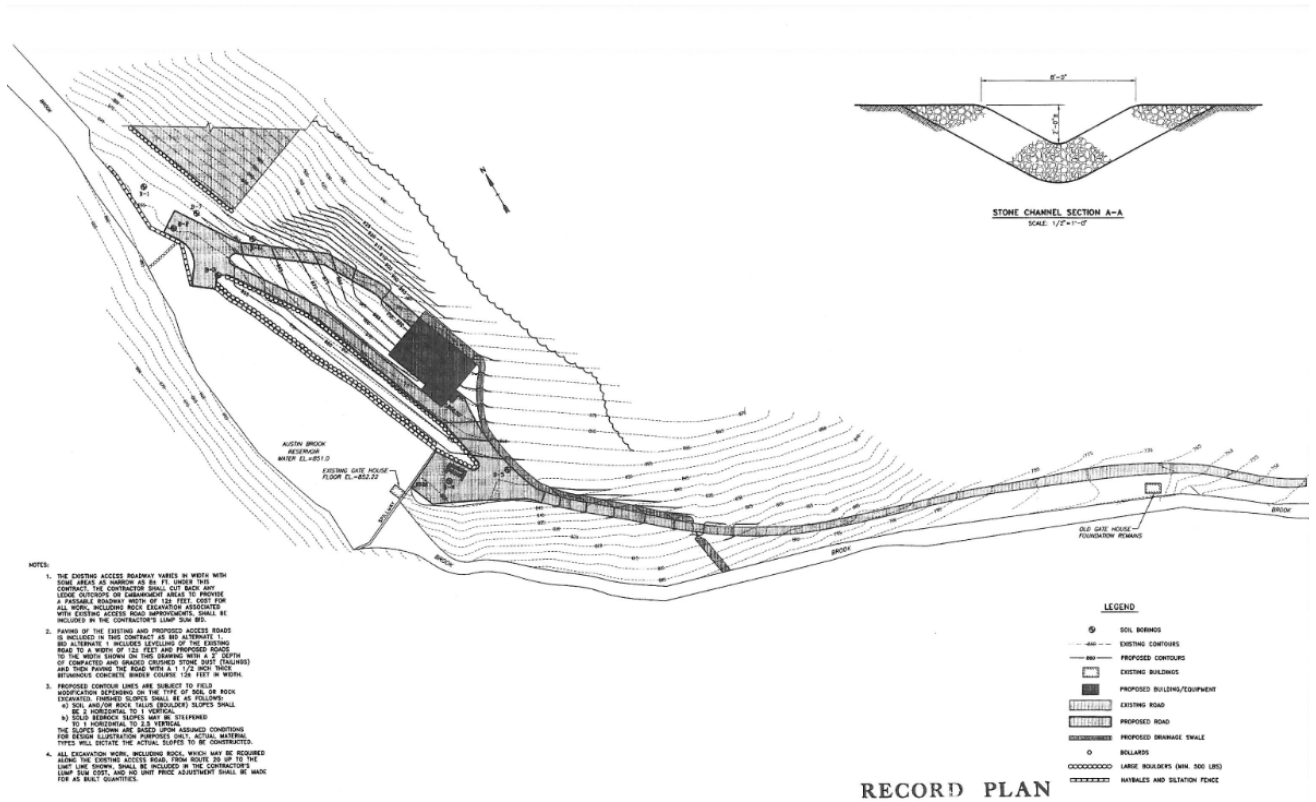
There was a large gap in recorded information for updated water mains within the Town. For those mains not having records, installation year and material are based on the institutional knowledge provided by the current CWD staff. The recommendations given for replacement of mine are based heavily on these assumptions. All mainline materials should be confirmed prior to replacement.

### 2.3 Vertical Asset Inventory

Vertical assets in the Town’s water system include the Chester Water Treatment Plant, Austin Brook Reservoir, and Horn Pond Reservoir. An inventory of the vertical assets was compiled from a variety of existing data, including:

- Record Drawings
- Equipment manufacturer information
- Past reports

In addition to the above-mentioned reports, onsite conditions observations at the water treatment plant were obtained to supplement the available information along with input from CWD staff. A complete vertical asset inventory is included in Appendix C. The recommendations developed by Tighe & Bond for each facility are included in Appendix D. As part of the inventory the Town was provided with GIS inspection forms for their assets. Screen shots of these GIS inspection forms are provided in Appendix E. An example record drawing can be seen below in Figure 2-1.



**FIGURE 2-1**  
Record Drawing - Austin Brook Reservoir Site Layout

**2.3.1 Surface Water Reservoirs and Watershed**

The Town has two surface water reservoirs, Austin Brook and Horn Pond.

**2.3.1.1 Austin Brook Reservoir and Watershed**

The Austin Brook Reservoir is located ½-mile off US Route 20 in Chester, on Reservoir Road. The reservoir has a surface area of approximately 0.3 acres and a drainage area of 1.25 square miles with a safe yield of 115,000 gallons per day. The reservoir is equipped with a gate house, screened intake, and concrete dam. Historically the reservoir has elevated turbidity during extreme weather events, this has made the reservoir unreliable. To reduce the influent turbidity caused by weather events it is necessary for the Town to periodically drain and clean the impoundment of sediment. Austin Brook’s raw water pumps are only a few years old and are exercised frequently.



**FIGURE 2-2**  
Austin Brook Reservoir

**2.3.1.1.1 Austin Brook Dam**

The Austin Brook Dam can be seen in Figure 2-3. The dam is made of concrete and is equipped with a bypass line and spill way. According to Town records, the dam needs some repairs as per a 2017 Lenart Consulting Services inspection report. The report was unavailable upon request. It is recommended that the Town conducts an updated dam inspection to assess current condition and to verify if there is a need for repairs beyond what was included in the 2017 inspection recommendations.



**FIGURE 2-3**  
Austin Brook Dam

**2.3.1.1.2 Austin Brook Gate House**

The Austin Brook Gate House can be seen below in Figure 2-4. Other than the water gate structures, the gatehouse contains raw water screens as well as a screen hoist (shown below). The building should be provided with properly designed ADA access, and railings are also recommended to improve overall safety at the access points and the raised valve platform.



**FIGURE 2-4**  
Austin Brook Gate House

### 2.3.1.2 Horn Pond Reservoir and Watershed

The Horn Pond reservoir is located in Becket, MA, off Wade Inn Road roughly 1 mile from the treatment plant and 2 miles from the center of Chester. The reservoir has a drainage area of 0.6 square miles and a safe yield of 170,000 gallons per day. The reservoir is equipped with an intake pipe running along the bottom of the pond, isolation valves, and an underground vault with screens. Horn Pond connects to the Austin Brook water treatment plant through a 6-inch ductile iron pipe laid cross county. The intake for this reservoir was inspected and improved in 2016 and is therefore considered to be in good condition. Access to Horn Pond is currently a major concern as the access road has been washed away for several years and needs reconstruction. Currently, water department staff needing to access Horn Pond must utilize private property.



**FIGURE 2-5**

Horn Pond Reservoir

### 2.3.2 Austin Brook Water Treatment Plant

The Austin Brook water treatment facility was constructed in 1993 and can receive raw water from both Town owned sources. The plant is a slow sand filtration facility, with an average daily flow design capacity of 160,000 gallons per day and a peak flow design capacity of 240,000 gallons per day. The plant is equipped with three variable speed raw water pumps, three dual media filters, and a clearwell made up of two unequal sized compartments.

The three dual media filters consist of three 15 feet wide by 49 feet long chambers that have 6 inches of Calgon F-400 activated carbon, 42 inches of sand, and 30 inches of support gravel. The carbon layer was installed to address elevated levels of disinfection by products.

The clearwell has a storage capacity of 330,000 gallons split unevenly between the two compartments. The concrete clearwell measures 73 feet long by 45 feet wide and has an overflow elevation of 13 ½ feet.

In the event of a power outage the treatment plant is equipped with a propane powered 35kW backup generator and a 1,000 liquid propane storage tank on the property. The generator is exercised automatically weekly to ensure the system works.

The treatment plant is capable of complete automated operation via a computerized control system and programmable logic controller (PLC). Most of the plant equipment is capable of automatic and manual operation.



**Figure 2-6**

Austin Brook Slow Sand Filtration Treatment Plant

## Section 3

# Criticality Analysis and Risk-Based Prioritization

To determine the criticality of system components, there are two important questions to consider:

1. How likely is the asset to fail?
2. If the asset does fail, what will be the consequence?

In the context of asset management, criticality (risk score) is calculated by an asset's likelihood or probability of failure (PoF) multiplied by the severity and extent of the consequences of that failure (CoF). A criticality-based approach to asset management will allow the Town to manage its overall risk and provide a logical and defensible framework for allocation of operation and maintenance dollars and capital expenditures.

The likelihood that an infrastructure component will fail is a function of the component's condition, performance, reliability, and maintenance history. Failure refers to the state of the asset not meeting a desired or intended objective. There are several modes of failure<sup>5</sup> that may occur, including:

- **Mortality** – The asset stops functioning due to a physical condition or break;
- **Capacity** – The asset is functioning but will not provide the quantity of service required (e.g., customer water demand is not being met);
- **Level of service** – Changes in customer needs or in regulations demand a higher level of service than the asset can deliver; and
- **Financial inefficiency** – The asset is costing more to repair than it would to replace.

If a component of the Town's water distribution system fails, the consequences widely differ in severity and impact to consumers. It is important to consider all the possible costs of failure, including cost of repair/replacement, collateral damage, social costs (i.e., loss of service to customers), legal costs (i.e., injuries or damages caused by failure), environmental costs, and other considerations such as inability to deliver desired level of service or loss of confidence in the water system. Tighe & Bond's methodology for determining PoF and CoF and subsequently criticality for the Town's water system is described below.

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<sup>5</sup> Modes of failure adapted from University of Southern Maine. Issue Brief, "Asset Management for Stormwater," April 2014. Available at: [http://digitalcommons.usm.maine.edu/cgi/viewcontent.cgi?article=1000&context=sustainable\\_communities](http://digitalcommons.usm.maine.edu/cgi/viewcontent.cgi?article=1000&context=sustainable_communities).

## 3.1 Probability of Failure (PoF)

### 3.1.1 Horizontal Asset PoF Methodology

The PoF for the Town's horizontal water assets (water mains) was calculated using:

- Pipe material – From record drawings
- Pipe age (as available) – From record drawings
- Soil corrosion potential for concrete – Natural Resources Conservation Service Soil Survey Geographic Database
- Soil drainage classification – Natural Resources Conservation Service Soil Survey Geographic Database

Each asset was given a score for each parameter, as shown in Table 3-1. The scores were weighed and averaged to give a total PoF score ranging from 1 to 5. The higher the score, the more likely the pipe section is to fail based on the available data.

For corrosion of concrete, if an AC pipe was found to be located in an area with high corrosion of concrete the pipe was flagged as being at high risk for POF.

**TABLE 3-1**  
Horizontal Asset PoF Scoring Criteria

Failure Mode	Weight	Evaluation Metric	Score					
			Excellent	Good	Moderate	Poor	Very Poor	
			1	2	3	4	5	
		Age by Material (when age is known refer to table – if age unknown score = 3)						
Pipe Material	75%	Ductile Iron	0-22 years	23-44 years	45-66 years	67-88 years	>88 years	
		Polyvinyl Chloride	0-20 years	21-40 years	41-60 years	61-80 years	>80 years	
		Copper	0-14 years	15-28 years	28-42 years	43-56 years	>56 years	
		Cast Iron	0-23 years	24-46 years	47-69 years	70-92 years	>92 years	
		Asbestos Cement	0-17 years	17-34 years	35-51 years	52-68 years	>68 years	
		Material	Ductile Iron	-	Polyvinyl Chloride	Unknown	Cast Iron	Asbestos Cement
External Damaging Factors	25%	Corrosion of Concrete	Low	-	Moderate	-	-	High
		Drainage Class	Excessively drained	Somewhat excessively drained	Well drained	Unknown	Moderately well drained	Poorly drained

**3.1.2 Vertical Asset PoF Methodology**

Probability of Failure (PoF) for vertical assets was determined by several factors including:

- Percent of life consumed
- Observed condition
- Location
- Performance based on capacity
- Performance based on regulatory compliance

Remaining useful life is based on an assets age and the expected service life of an asset.

Site visits were completed by Tighe & Bond staff to evaluate the physical condition of CWD assets. Visual assessments and input from operators facilitated the determination of criticality based on known and observed deficiencies. Please note that the condition assessment of assets was strictly based on a visual inspection.

Each asset was given a score for each of the 5 parameters, as described in the grading criteria in Table 3-2. The scores were weighed and averaged to give a total PoF score ranging from 1 to 5. A score of 5 indicates that the asset has a high likelihood of failure while a 1 indicates a low likelihood of failure.

**TABLE 3-2**  
Vertical Asset PoF Scoring Criteria For Process

Failure Mode	Weight	Evaluation Metric	Excellent 1	Good 2	Moderate 3	Poor 4	Very Poor 5
<b>Mortality Failure</b>	<b>75%</b>	Percent of Life Consumed	0%-24%	25%-49%	50%-74%	75%-99%	"Exceeds Design Life (>=100%)"
		Condition based on observation	1. Little to no corrosion; vibrations or unusual noises; all major and minor system components appear to be present and operational.		3. Superficial corrosion; minor vibrations and/or noises; failure of coating systems; all major system components present and operational; minor system components missing or failed		"5. Significant corrosion;
		Location	1. Asset location does not pose an immediate threat to asset.		3. Asset is exposed to weather or located in an area that may be susceptible to accidental damage (flooding due to other equipment failure, vehicle strike, etc.)		5. Asset (and all associated systems) is located within the 100 year + 3' floodplain elevation
<b>Performance Failure</b>	<b>25%</b>	Capacity - Performance Failure	1. Exceeds design/current capacity requirements and can accommodate system growth.	2. Meets desired capacity under all conditions.	3. Meets desired capacity a majority of the time.	4. Only able to meet design capacity occasionally.	5. Does not meet design flow under any conditions.
		Regulatory Compliance - Performance Failure	1. Facility achieves compliance with current regulations, and pending regulations, as a result of asset performance.		3. Facility achieves compliance with current regulations, but would not meet pending regulations, if imposed.		5. Facility does not achieves compliance with regulations as a result of asset performance.

## 3.2 Consequence of Failure (CoF)

Tighe & Bond and CWD staff considered the cost and impact of hypothetical failure scenarios and asset failures would have on customers, community, regulatory compliance and local government based on past experiences. The greater the consequence of failure, the more critical a particular asset will be, and the higher the CoF score. The ranking point of the CoF rating is innately difficult due to the inability to predict and encompass all possible direct or indirect consequences of failure. Sections 3.2.1 and 3.2.2 below describe the methodology of how CoF ratings were calculated for horizontal and vertical assets, respectively for this project. Additional CoF metrics or scores could be added or modified in the future to adjust the prioritization analysis.

### 3.2.1 Horizontal Asset CoF Methodology

CoF metrics are more subjective than PoF and specific to each community related to the cost or impact of failure on the community, local government, or regulatory compliance. CoF factors can include:

- How important is each asset for meeting the desired Level of Service Goals?
- What is the severity of impact of a failed asset (environmental, social, economic, safety impacts, etc.)?
- Asset size and location may play a role, as failure of an 8-inch water main on a busy street would have a larger impact than failure of a 2-inch water main in a cul-de-sac.

Horizontal CoF rankings were determined based on economic and social parameters. Economic parameters included pipe characteristics and maintenance accessibility. Social parameters included proximity to critical locations. Land use based on information derived from the state's geographical information system (GIS) database. In Massachusetts, GIS land use codes, which describe how land is used, primarily originating from the MassGIS Property Tax Parcels layer. These codes can be found in Appendix M.

Each asset was given a score for each parameter, as shown in Table 3-3. The scores were weighted and averaged to give a total CoF score ranging from 1 to 5. A higher score indicates a larger consequence if the pipe segment were to fail.

**TABLE 3-3**  
Horizontal Asset CoF Scoring Criteria

Failure Mode	Weight	Evaluation Metric	Score								
			Excellent	Good	Moderate	Poor	Very Poor				
			1	2	3	4	5				
Pipe Characteristics	75%	Size	<2	2-4	Unknown	4-8	>8				
Critical Locations	25%	Land Use*	1320, 1300, 9300, 9380, 9950, 4100, 6010, 8140, 8050, 9030, 9050	1020, 1010, 9390, 1060, 9350, 9310, 9970, 9940	(Improved Land; Single Family; Other)	1090, 310, 3160, 3320, 3430, 3400, 3250, 1040, 170, 1120, 9700, 3340, 3260, 3500, 1250, 470, 9010, 1110, 160, 130, 1050, 3220, 3530, 3350, 4040, 3560, 3410, 3700, 3860, 3550, 3300, 3750, 3380, 380, 830, 3880, 1030, 810, 3310, 180	(Business; Mixed Use; Multi-Family)	9320, 4000, 9290, 3230, 8030, 9820, 9240, 3690, 9500, 9100, 9530, 9510, 9110, 3010, 9610, 9540, 9600, 9040, 9060, 9580, 9210, 9590, 9220, 3840, 9420, 9170, 7200, 4010, 8110	(CDC Tier 2; Charitable; Land Conservation; Religious Groups; State land)	4310, 3180, 7190, 3170, 4230, 4320, 9000, 7100, 7160, 4280, 4300, 3040, 9340, 3420, 3050, 4240, 9430, 3520, 9230, 9160, 3930, 4200, 4500	(Agricultural/Horticultural; CDC Tier 1; Federal Land; Utility)

\*Land Use Codes can be found in Appendix M

### **3.2.2 Vertical Asset CoF Methodology**

The overall CoF score for CWD's vertical assets was based on the asset specific implications including:

- Asset type
- Safety concerns if failure occurs
- Redundancy

Assets were categorized into different types and given a score from 1 to 5. For example, disinfection equipment and the pumping equipment are integral parts of the Town's ability to convey and treat water, thus they were designated with the highest asset-type CoF score.

Each asset was given a score for each of the 3 parameters, as described in the grading criteria in Table 3-4. The scores were weighed and averaged to give a total PoF score ranging from 1 to 5. A score of 5 indicates that the asset has a high consequence of failure while a score of 1 indicates a low consequence of failure.

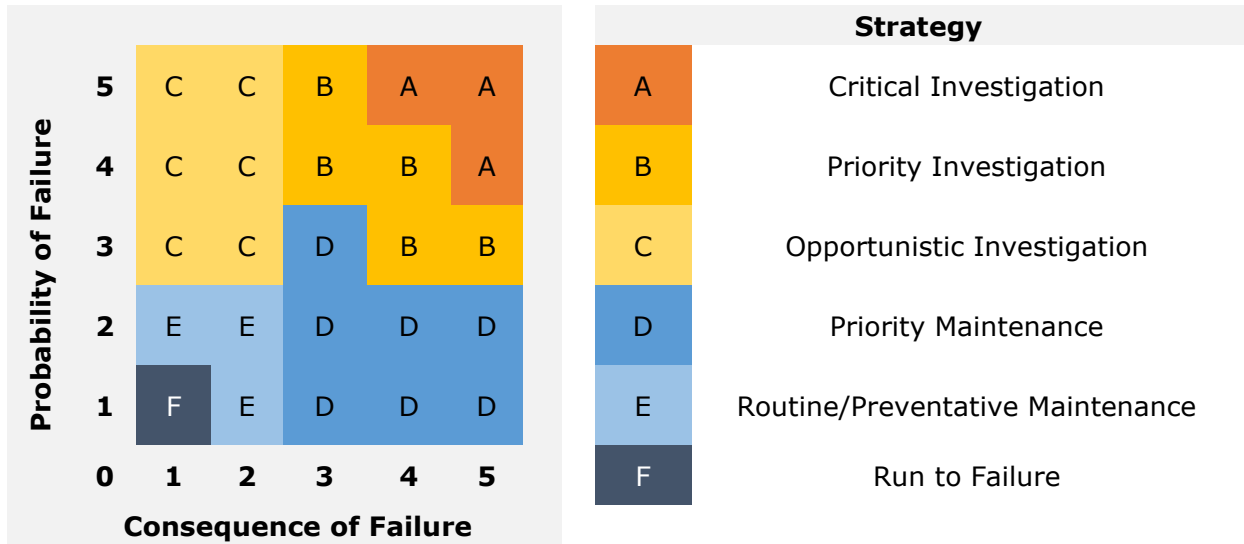
**TABLE 3-4**

Vertical Asset CoF Scoring Criteria For Process

Failure Mode	Weight	Evaluation Metric	Score				
			1	2	3	4	5
Asset Specific Implications	50%	Drinking Water Treatment		Residuals Management, Civil/Site Safety & Security	Filtration, Instrumentation/ Monitoring	Chemical Treatment Systems, Water Storage	Distribution Pumps, Disinfection
Safety	50%	Direct Measurement	Asset failure would not result in safety concerns to operators or public health.		Consequence of asset failure may result in at least one safety concern to operator or general public.		Consequence of asset failure may result in many safety concerns, for both operators and the general public.
			-50%	-25%	-10%	-5%	0%
Redundancy Modifier		Direct Observation	Full Redundancy - Duty unit has a second unit operating in parallel. If duty unit fails, secondary unit takes over and handles full demand.	Standby Redundancy - A separate unit, not operating, but ready to operate when the duty unit stops operating.	Backup - A secondary unit from somewhere else can be brought in if the duty unit fails.	Workaround Available - Duty unit can be bypassed and operation maintained	No Redundancy.

### 3.3 Horizontal Risk-Based Prioritization

Tighe & Bond ranked the assets based on the risk scores found using the asset’s probability of failure score by the asset’s consequence of failure score on the following matrix shown in Figure 3-1:



**FIGURE 3-1**  
Asset Management Strategies

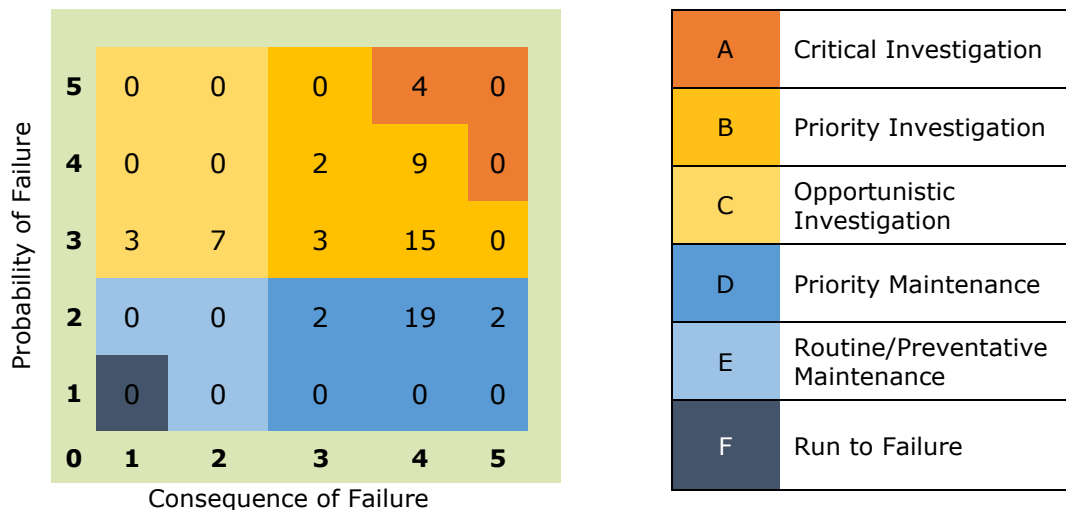
This matrix was used for both vertical and horizontal assets.

The resulting risk tier (A-F) helps the Town in prioritizing asset monitoring. More detail about each of the risk tiers can be seen in Table 3-5 below.

**TABLE 3-5**  
Asset Management Strategies Horizontal Assets

Strategy	Description
<b>A</b> Critical Investigation	High PoF, High CoF. Asset has surpassed its expected service life and has severe consequences if it fails. Asset should be investigated and potentially repaired or replaced within 5 years.
<b>B</b> Priority Investigation	High PoF, High CoF. Asset is nearing the end of its expected service life and has a high consequence if it fails. Asset should be investigated and potentially repaired or replaced within 5-10 years.
<b>C</b> Opportunistic Investigation	High PoF, Moderate CoF. Asset has little consequence if it fails. Asset is recommended for investigation opportunistically or as it fails.
<b>D</b> Priority Maintenance	Moderate PoF, High CoF. Asset is less likely to fail but has a high consequence if it fails. Asset should be added to a priority maintenance schedule.
<b>E</b> Routine/Preventative Maintenance	Low PoF, Low CoF. Asset is less likely to fail and has little consequence if it fails. Preventative maintenance is recommended on a routine schedule.
<b>F</b> Run to Failure	Low PoF, Low CoF. Asset is not likely to fail and has little consequence if it fails. No scheduled maintenance is recommended.

A breakdown of PoF and CoF scores is shown in Figure 3-2 below. The number in each box represents the count of segments of mains ranked in that quadrant.



**FIGURE 3-2**  
Horizontal Asset Management Strategies Output

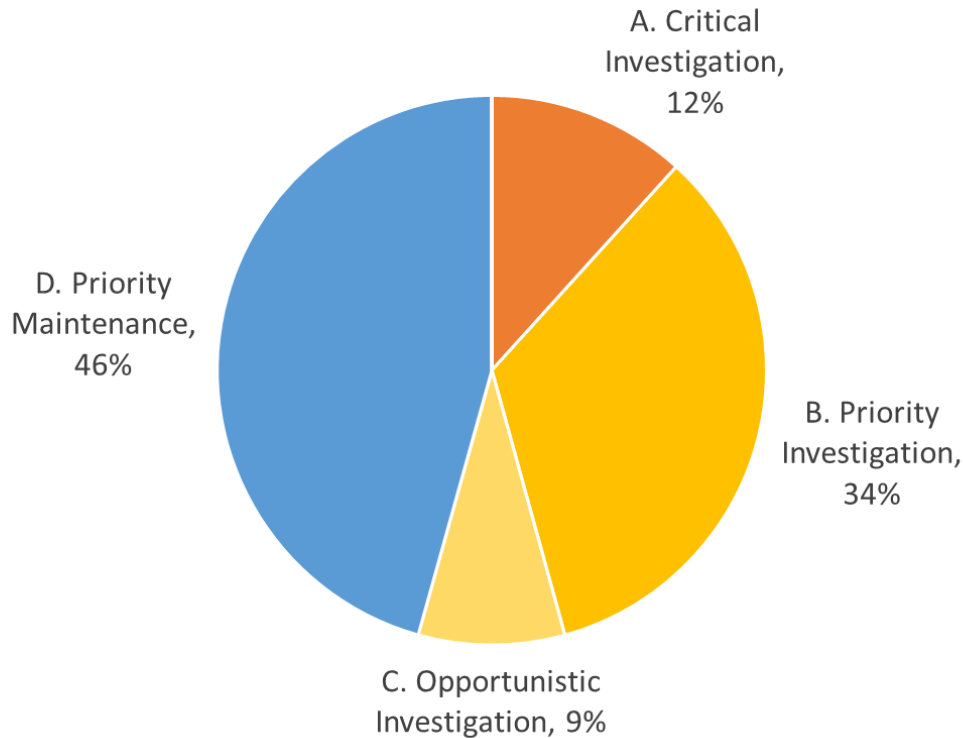
Table 3-6 provides a summary of water main pipe lengths and their associated asset management strategies. The asset management strategies assigned to each pipe segment in this project were added as attributes to the active water pipes in GIS. A Risk Assessment Map was developed to show higher risk areas of the system (*Appendix I: Water System Risk Assessment Map*).

**TABLE 3-6**  
Water Main Lengths by Risk

AM Strategy	Water Main		
	Count	Length (LF) <sup>1</sup>	%
A. Critical Investigation	4	6,849	12%
B. Priority Investigation	26	19,854	34%
C. Opportunistic Investigation	10	5,028	9%
D. Priority Maintenance	26	26,680	46%
E. Routine/Preventative Maintenance	0	0	0%
F. Run to Failure	0	0	0%

<sup>1.</sup> Pipe lengths are based on available GIS data.

Figure 3-3 provides a distribution of the recommended asset management strategies for water horizontal assets. Over half of the water pipes have recommendations for investigations and leak detection, which could lead to repair or replacement, with the remaining recommendations including priority or routine maintenance. Recommendations and cost estimates for the higher priority vertical and horizontal assets are described further in Section 4, including the critical pipe repair and replacement recommendations shown in Figure 3-3.



**FIGURE 3-3**  
Summary of Chester's Assets by Strategy

Appendix I displays the risk tier of each water main on a system map. Copies of the complete horizontal asset inventories are presented in Appendix A.

### 3.4 Vertical Risk-Based Prioritization

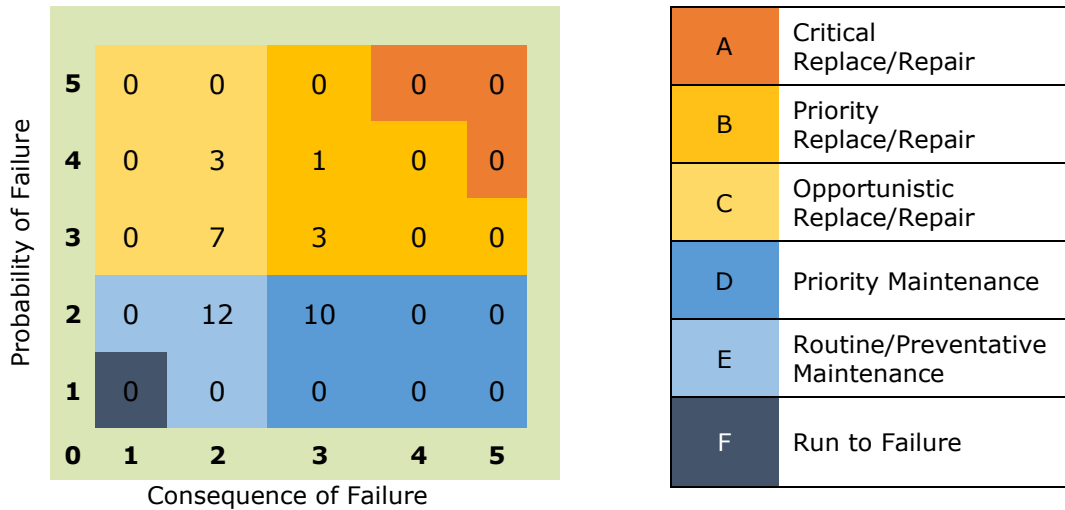
Tighe & Bond assigned asset management strategies based on the PoF and CoF using the risk matrix shown in Figure 3-1.

The asset management strategies are defined in Table 3-7.

**TABLE 3-7**  
Asset Management Strategies Vertical Assets

Strategy		Description
A	Critical Replace/Repair	High PoF, High CoF. Asset has surpassed its expected service life and has severe consequences if it fails. Asset should be replaced/repared within 5 years.
B	Priority Replace/Repair	High PoF, High CoF. Asset is nearing the end of its expected service life and has a high consequence if it fails. Asset should be replaced/repared within 5-10 years.
C	Opportunistic Replace/Repair	High PoF, Moderate CoF. Asset has little consequence if it fails. Asset is recommended for replacement/repair opportunistically or as it fails.
D	Priority Maintenance	Moderate PoF, High CoF. Asset is less likely to fail but has a high consequence if it fails. Asset should be added to a priority maintenance schedule.
E	Routine/Preventative Maintenance	Low PoF, Low CoF. Asset is less likely to fail and has little consequence if it fails. Preventative maintenance is recommended on a routine schedule.
F	Run to Failure	Low PoF, Low CoF. Asset is not likely to fail and has little consequence if it fails. No scheduled maintenance is recommended.

A breakdown of PoF and CoF scores is shown in Figure 3-4 and Table 3-8. Chester's vertical assets are in generally good shape with no critical repairs or replacements identified and only one priority item identified. Refer to Table 3-7 for a description of the asset management strategies for vertical assets. The number in each box represents the quantity of assets ranked in that quadrant.



**FIGURE 3-4**  
Vertical Asset Management Strategies Output

**TABLE 3-8**  
Assets by Risk

Asset Management Strategy	Count	% of Assets
A. Critical Replace/Repair	0	0%
B. Priority Replace/Repair	1	3%
C. Opportunistic Replace/Repair	10	28%
D. Priority Maintenance	13	36%
E. Routine/Preventative Maintenance	12	33%
F. Run to Failure	0	0%

### 3.5 Horizontal Asset Recommendations

Tighe & Bond recommends three leak detection and inspection projects based on the results of the horizontal asset inventory. Additionally, Tighe & Bond recommends an annual water line replacement project focusing on replacing the aging cast iron, AC, and unknown water mains over a 100-year period. The many horizontal assets were grouped into four projects based on relative location within the town. Sections of watermain were included in these four projects as long as they were medium risk or above. These projects are shown in Table 3-9. The breakdown of Central, Eastern, and Western Chester can be seen in Appendix J.

**Table 3-9**

Horizontal Asset Recommendations

<b>Chester's Water Department Horizontal Asset Recommendations</b>	
<b><u>Horizontal Assets</u></b>	
<b>Projects</b>	<b>QTY (LF)</b>
<b><u>Project 1:</u></b>	
Central Chester Leak Detection	22,703
<b><u>Project 2:</u></b>	
Eastern Chester Leak Detection	10,130
<b><u>Project 3:</u></b>	
Western Chester Leak Detection	25,578
<b>Leak Detection Total</b>	<b>58,411</b>
<b><u>Project 4:</u></b>	
Annual Water Main Replacement	17,594
<b>Water Main Replacement Total</b>	<b>17,594</b>

\*Please note that coordinating and working with Mass Rural Water, as the town has done historically for leak detection, could provide substantial savings with leak detection efforts

These four projects were then separated into high and medium priority projects depending on the risk scores of the individual assets within each project area. Leak detection is recommended over mainline replacement currently due to uncertainty of mainline locations and mainline conditions in many areas. Some areas have dual mains, but the reason behind the dual mains is unknown. Some areas have had pipe leaks on pipes that should be abandoned, so replacement of those lines is not necessary, however identifying the locations of the leaks for future repairs or abandonments is needed.

Leak detection efforts should identify and prioritize issues with current water mains in town. That prioritization should be used to develop a water main replacement plan that the Town can move forward with in the future. With over 58,000 linear feet of water main in Town it is not feasible to replace all of it at once. A replacement plan based on the leak detection findings will also potentially allow the Town to pursue grants or other funding opportunities not currently available. This report does not identify any water main that needs to be replaced currently due to the current data gap that exists with mainline conditions. Potential mainline replacement costs are included in section 3.7. Funding for these projects will need to be further investigated as the scope becomes better defined. At a minimum, the Town should plan to prioritize investigating the older Asbestos Cement

and Cast-Iron mains as those are the oldest and potentially most likely candidates for replacement.

To account for the replacement of mains identified during leak detection as well as mains reaching the end of their useful life, the Town should assume that 1% of the cast iron, AC, and unknown pipes will be replaced per year. It is assumed that replacing 1% of these pipes will cost about \$67,000. It is recommended that the Town focuses on replacing the high-risk AC, cast iron, and unknown water mains.

### **3.5.1 High Priority Projects (0-5 Years)**

A summary of the recommended projects that should be completed as soon as possible for horizontal assets are listed below. A full description and approximate cost for each of the high priority recommended horizontal projects can be found in Appendix B: Horizontal Asset Recommendations. These projects should be completed within 5 years of this report.

#### Central Chester Leak Detection & Inspection

The following sections of line were identified as areas that need leak detection: Huntington Rd, Main St, Maple St, and Middlefield Rd. These sections of lines were identified as high-risk or medium-risk sections of line based on the asbestos cement pipe being installed in high acidic soil and the age of the lines. The lines in these areas range from 1 to 8 inches in diameter and were installed in the 1990s or the installation date is unknown. It is recommended that these sections of lines be inspected for leak detection.

#### Eastern Chester Leak Detection & Inspection

The following sections of line were identified as areas that need leak detection: Baystate Dr, from Baystate Dr to Emery St, and the eastern section of Huntington Rd. These sections of lines were identified as high-risk or medium-risk sections of line based on the asbestos cement pipe being installed in high acidic soil and the age of the lines. The lines in these areas range from 2 to 8 inches in diameter and no installation dates are known. It is recommended that these sections of lines be inspected for leak detection.

### **3.5.2 Medium Priority Projects (5-10 Years)**

The following water system projects should be completed within 5-10 years of this report.

#### Western Chester Leak Detection & Inspection

The following sections of line were identified as areas that need leak detection: Reservoir Drive and the end of Horn Pond Line. These sections of lines were identified as medium-risk sections of line based on the age of the lines. The lines in these areas range from 6 to 8 inches in diameter and were installed in the 1990s. It is recommended that these sections of lines be inspected for leaks.

### **3.5.3 Low Priority Projects (10-15 Years)**

The following water system projects should be completed within 5-10 years of this report.

#### Annual Water Main Replacement

To address both the replacement of water mains identified through leak detection and those approaching the end of their service life, the Town should allocate funding to replace

at least 1% of the existing cast iron, asbestos cement (AC), and unidentified piping each year. It is estimated that this annual replacement rate will require a budget of approximately \$67,000. Priority should be given to the replacement of high-risk AC, cast iron, and unknown water mains. To optimize costs and implementation efficiency, the Town may consider bundling annual replacements into larger capital projects supported by bond financing. Additionally, pursuing external funding sources—such as Community Development Block Grants—can further help control costs and support long-term infrastructure investment.

## 3.6 Vertical Asset Recommendations

### 3.6.1 Water System Vertical Projects

Tighe & Bond met with Town staff to evaluate the current condition of assets in the water system. Based on the findings from the conditions assessment, evaluation, and risk-based prioritization, a list of recommendations was developed for the Austin Brook water treatment plant. The reasons for the recommendations include safety concerns, code violations, deficient lighting, and other areas needing improvement within the water system.

#### 3.6.1.1 High Priority Projects (0-5 Years)

A summary of the recommended projects that should be completed within three years for vertical assets are listed below. These projects are a combination of safety, control, rehabilitation, and report projects all focused on the highest risk concerns that Chester's water system currently faces. A full description and approximate cost for each of the immediate recommended vertical projects can be found in Appendix D: Recommended Vertical Projects. These projects should be completed within 5 years of this report.

##### Austin Brook Source Upgrade Project – Access Improvements

It is recommended to improve the access path to the screen house with an ADA complaint galvanized steel or aluminum access path with stairs, railings and toe plates. The current access path lacks either of these and is a potential safety hazard.

##### Austin Brook Source Upgrade Project – Hoist Replacement

The gatehouse currently has a hoist system with no load rating, and it appears to be undersized for handling any kind of heavy equipment. Therefore, it is recommended that this hoist system be upgraded to improve operational safety at this building.

##### Austin Brook/Horn Pond Source Upgrade Project – Screen Component Upgrade

Screen upgrades are recommended at both Austin Brook and Horn Pond. At Austin Brook, the existing screens have been found to be inadequate and appeared to be removing minimal sediment from the influent raw water. It is recommended to upgrade these screens to ensure finer materials are being removed from the water. As for Horn Pond, the current screens on site are in the middle of the pond and require a boat to access/perform maintenance. They also seem to be undersized and lack regular maintenance due to their restricted access. Therefore, it is recommended to install a new screen system to increase access and allow maintenance to be more of a priority.

##### Enterprise Improvements Project

It is recommended that the GIS system be maintained and updated yearly to ensure that the Town of Chester can build on the established system. As part of this, it is

recommended to invest in a yearly GIS subscription. It is also recommended to pursue on call GIS services that include support for the existing GIS system for the water department.

#### Horn Pond - Inspection of Inlet Pipe & Report

Horn Pond's inlet pipe was recently anchored to the bottom of the pond by the Town. In the past the pipe was prone to air binding resulting in flow restrictions. It is recommended to conduct an inspection of this intake line to assess its current condition.

#### Horn Pond - Repairs/Replacement of Inlet Line

Depending on the findings of the inlet pipe inspection, there will likely need to be improvements made to the inlet line to continue operating at this pond.

#### Horn Pond - Lands/Property Purchase around Pond

The pond is currently only accessible by boat via private property, which makes maintaining the pond and its assets increasingly difficult. It is recommended to purchase the necessary property surrounding the pond to make it easier for water staff to maintain the pond's screens, lines, etc. and protect the raw water source from potential contamination.

#### Water Treatment Plant - Austin Brook Engineering Pumping Report

The raw water pumping system at the Austin Brook Treatment facility underwent changes from the original pump design at the treatment plant after initial construction. Over time, operation and maintenance of these modified elements was not kept up. Currently, operations staff have made additional modifications to correct previous issues, however documentation of the results of these modifications is limited. It is therefore recommended that an engineering study be conducted to identify issues and potential improvements to these current pumping techniques and methods. As part of this evaluation, it is recommended that the Town put funds aside to assist in the upgrade of this pumping system.

#### Water Treatment Plant - Replacement of Pipe Supports

It is recommended that the current pipe supports at the treatment plant be replaced to ensure operational safety.

#### Water Treatment Plant - Replacement of Raw Water Assets

At the water treatment plant, raw water is piped through the plant's basement wall. The pumping system that handles this raw water is currently facing several issues including a check valve being identified as a potential failure point and inadequate pre-filtering. It's recommended that the check valve and pre-filter be replaced to keep water moving into the treatment plant.

### **3.6.1.2 Medium Priority Projects (5-10 Years)**

The following water system projects should be completed within 5-10 years of this report.

#### Austin Brook Source Upgrade Project - Dam Evaluation and Study

The existing dam is showing signs of structural damage, and it is recommended that it be fully evaluated to determine the needed improvements to ensure functionality of this asset.

#### Filter/Clearwell Improvements Project - Site Lighting Upgrade

The lighting on the roof of the filter plant is inadequate and it is recommended to implement additional site lighting to the roof to provide additional security for operators.

Filter/Clearwell Improvements Project – Structural Rehabilitation

There are currently structural concerns for the filter, more specifically the 6 filter hatches on the roof. It is recommended that these structural concerns be addressed to ensure the functionality of the asset.

Former Chlorination Building Improvement Project – Building Sealing

The former chlorination building has several breaches that have allowed small animals and insects to enter. Their presence could result in damage to some of the equipment within the building. It is recommended that these openings be properly sealed and that ventilation pipes be screened to prevent further pest intrusion and equipment deterioration.

Horn Pond – Maintenance/Access Evaluation

Due to the lack of access, it is recommended that the Town evaluate the current access to the pond. This will most likely lead to the rebuilding and improvement of the access road to establish a more permanent right of entry to the pond. This will help operators be able to perform more regular maintenance.

Water Treatment Plant – Disinfection By Product Study

It is recommended to conduct an additional study at the treatment plant to determine if a pre-oxidant would be beneficial in reducing total organic carbon to the system, which could help to reduce disinfection by products in the finished water. Testing throughout the distribution system should be done to identify these by products. As part of this study, a chlorine residual analysis is recommended to assist in identifying the causes for the formation of disinfection by-products within the distribution system.

Water Treatment Plant - Replacement of Back Flow Preventer

The existing backflow preventer for chemical addition needs replacement. It is recommended to replace this asset to avoid concentrated chemical water back-flowing into the distribution system.

### **3.6.1.3 Low Priority Projects (10-15 Years)**

Austin Brook/Horn Pond Source Upgrade Project –Pre-Oxidant Study

It is recommended to conduct a study to evaluate different treatment techniques as it would be beneficial in reducing iron/manganese and total organic carbon to the system. New treatment strategies could also help to reduce disinfection by products that Chester is currently struggling with.

Austin Brook Source Upgrade Project – Reservoir Maintenance

The reservoir has historically had issues with iron and manganese as well as sedimentation. The sedimentation has caused concern and required regular removal maintenance in 2024. It is recommended to perform this maintenance on a more frequent basis going forward.

Filter/Clearwell Improvements Project – Structural Inspection

There are signs of minor cracking and deterioration concerns for the clearwell exterior walls. It is recommended that the clearwell be inspected for structural concerns to identify any needed rehabilitation.

#### Water Treatment Plant – Surface Prep and Painting of Valves

The valves at the water treatment plant require surface prep-work and repainting to prevent additional rusting and damage.

### **3.6.2 Ground Water Source Development**

The Town is concerned with the lack of raw water quantity and quality and are looking for a more reliable source of water. It is recommended to investigate options for an additional groundwater source. Due to the lack of consistency in surface water, the Town is looking into adding a groundwater source. The Town has begun conversations with DEP on what steps are required, however, more investigation into the requirements of adding a groundwater source needs to be done. It is recommended that the Town pursue potential grant or low interest loan funding to support these investigations. The costs associated with evaluating a new groundwater source were not included in this report.

### **3.6.3 Watershed Protection Efforts**

In 2024, the Chester Water Department completed a Source Water Protection Plan, prepared in collaboration with the Massachusetts Rural Water Association. Following the plan's recommendations, the department should continue its commitment to protecting drinking water sources by engaging in the following key activities:

- Sustaining public education efforts focused on source water protection.
- Conducting regular inspections within the Source Water Protection Area.
- Posting and maintaining clear signage designating Surface Water Supply Protection Areas.
- Keeping emergency contact lists current and ensuring regular emergency preparedness training.
- Reviewing and updating the department's Emergency Response Plan as needed.

Additionally, the plan recommends enhancing both the Chester Water Department and Town of Becket websites to include educational resources on protecting Surface Water Supply Protection Areas and the broader public drinking water system.

Finally, the department was advised to strengthen its asset management program which was completed as part of this project. Further maintenance includes conducting annual map reviews and updating GIS data to reflect any new system components or changes to the Surface Water Supply Protection Areas.

## **3.7 Opinion of Probable Construction Cost (OPCC)**

Tighe & Bond developed an opinion of probable construction cost (OPCC) for both vertical and horizontal assets. The OPCC is separated into detailed sections for each project identified throughout this AMP. All prices are based on Tighe & Bond experience on projects with similar items, combined with available data, unless explicitly stated otherwise. More detailed overview of OPCC's for each project can be found in Appendices B & D. Looking

ahead, there are several low rated lines that should be tested for leak detection within the next 15 years to ensure functionality. Table 3-11 provides a project-by-project cost breakdown of each of the recommended projects including the following multipliers:

- 30% for project contingency,
- 30% for engineering services,
- For report and enterprise projects no multipliers were applied

A summary table detailing the 5-year period project costs for vertical and horizontal projects is provided in Table 3-12. All project costs are presented in present worth costs and will likely be more expensive in the future accounting for inflation and fluctuations with the construction market.

The mainline water replacement costs are not included in the overall OPCC at this time and will depend on leak detection results. Provided below are unit cost per linear foot for different sized pipes within the distribution system as shown in Table 3-10.

**Table 3-10**

Water Main Unit Cost

Water Main Size	Water Main Cost	Project Unit Cost <sup>1</sup>
4"	\$130	\$260
6"	\$150	\$300
8"	\$190	\$380

1. Project Unit Cost includes 40% restoration cost, 10% contractor markup, 10% overhead and profit, 20% contingency, and 20% engineering.

To address both the replacement of water mains identified through leak detection and those approaching the end of their service life, the Town should allocate funding to replace at least 1% of the existing cast iron, asbestos cement (AC), and unidentified piping each year. It is estimated that this annual replacement rate will require a budget of approximately \$67,000. Priority should be given to the replacement of high-risk AC, cast iron, and unknown water mains. To optimize costs and implementation efficiency, the Town may consider bundling annual replacements into larger capital projects supported by bond financing. Additionally, pursuing external funding sources—such as Community Development Block Grants—can further help control costs and support long-term infrastructure investment.

**TABLE 3-11**

Water Capital Improvement Project OPCC

Project #	Project Type	Project Description	Location	Project Cost	Project Start
<b>Vertical</b>					
1	Safety	Hoist Replacement	Austin Brook	\$24,000	FY26-FY31
2	Safety	Access Improvements	Austin Brook	\$48,000	FY26-FY31
3	Upgrade	Screen Upgrade	Austin Brook	\$48,000	FY26-FY31
4	Maintenance	Inlet Pipe Inspection	Horn Pond	\$24,000	FY26-FY31
5	Maintenance	Inlet Line Replacement/Repair	Horn Pond	\$80,000	FY26-FY31
6	Safety	Lands/Property Purchase Around Pond	Horn Pond	\$80,000	FY26-FY31
7	Upgrade	Screen Upgrade	Horn Pond	\$80,000	FY26-FY31
8	Maintenance	Replacement of Raw Water Check Valve	Raw Water	\$24,000	FY26-FY31
9	Maintenance	Replacement of Raw Water Pre-Filter	Raw Water	\$24,000	FY26-FY31
10	Report	Austin Brook Engineering Pumping Report	Raw Water	\$25,000	FY26-FY31
11	Enterprise	GIS Yearly Subscription	Water Enterprise	\$1,000*	FY26-FY41
12	Enterprise	On-Call GIS Water Department	Water Enterprise	\$4,000*	FY26-FY41
13	Safety	Replacement of Pipe Supports	Water Treatment Plant	\$24,000	FY26-FY31
14	Report	Phase I Dam Inspection	Austin Brook	\$10,000	FY31-FY36
15	Maintenance	Structural Rehab	Filter/Clearwell	\$100,000	FY31-FY36
16	Upgrade	Site Lighting Upgrade	Filter/Clearwell	\$24,000	FY31-FY36
17	Maintenance	Building Sealing	Former Chlorination Building	\$16,000	FY31-FY36
18	Report	Horn Pond Maintenance/Access Evaluation	Horn Pond	\$40,000	FY31-FY36
19	Report	DBP Study	Water Treatment Plant	\$30,000	FY31-FY36

Project #	Project Type	Project Description	Location	Project Cost	Project Start
20	Safety	Replacement of Back Flow Preventer	Water Treatment Plant	\$7,000	FY31-FY36
21	Maintenance	Reservoir Maintenance	Austin Brook	\$24,000	FY36-FY41
22	Report	Structural Inspection of Filters and Clearwell	Filter/Clearwell	\$20,000	FY36-FY41
23	Report	Pre-Oxidant Study	Horn Pond/Austin Brook	\$40,000	FY36-FY41
24	Maintenance	Surface Prep and Paintings of Valves	Water Treatment Plant	\$16,000	FY36-FY41
<b>Horizontal</b>					
1	Distribution	Central Chester Leak Detection & Inspection	Central Chester	\$6,000	FY26-FY31
2	Distribution	Eastern Chester Leak Detection & Inspection	Eastern Chester	\$5,000	FY26-FY31
3	Distribution	Western Chester Leak Detection & Inspection	Western Chester	\$10,000	FY31-FY36
4	Distribution	Annual Water Main Replacement	System Wide	\$67,000*	FY36-FY41
					<b>Total: \$1,239,000</b>

\*Cost carried over multiple years

**TABLE 3-12**

Water Capital Improvement Project by Fiscal Year Range

Fiscal Year Range	Total Vertical Project Costs	Total Horizontal Project Costs
FY26-FY31	\$506,000	\$11,000
FY31-FY36	\$252,000	\$10,000
FY36-FY41	\$125,000	\$335,000
<b>Total</b>	<b>\$883,000</b>	<b>\$356,000</b>

## Section 4

# Cost Impacts to Implement Asset Management Plan

The previous sections demonstrated the initiative and desire of the CWD to proactively manage their water distribution assets. However, the greatest challenge associated with implementation of any asset management program is a municipality's ability to allocate funds to pay for the improvements identified in the recommendations section of this AMP. This section explores CWD's cash flow availability and revenue needs for the future. Customer billing impacts and rate recommendations are not included in this evaluation.

### 4.1 Chester Water Department Budget

The CWD maintains an internal budgetary projection of current operating expenditures including improvements to the existing water system. Table 4-1 summarizes the FY 2024 budget and the FY 2025 budget appropriated by the Water Department's Water Enterprise Fund. The CWD budgets more expenditures than they plan on spending to account for savings to the enterprise fund. The budget surplus line item is held to account for savings to the enterprise fund.

**TABLE 4-1**

Chester Water Enterprise Fund - Expenses

Description	FY 2024 Budget	FY 2024 Actual	FY 2025 Budget
Salaries & Wages	\$ 65,765	\$29,031	\$ 75,822
Operation & Maintenance	\$ 45,150	\$44,309	\$ 75,000
Purchase of Services	\$ 25,200	\$24,748	\$ 0
Prior Year Expenses	\$ 5,888	\$4,940	\$ 621
Budget Surplus	\$ 13,083	\$114,073	\$ 15,000
Debt Service	\$ 29,479	\$29,479	\$ 120,000
<b>Total Expenses</b>	<b>\$ 184,565</b>	<b>\$246,580</b>	<b>\$ 286,443</b>

The budget expenditures from FY23 through FY25 were analyzed to determine trends and determine what future expenditures could be. For future expenditures the following escalation factors were used:

- Salaries & Wages – 5% per year
- Operation & Maintenance – 5% per year
- Purchase of Services – 5% per year
- Prior Year Expenses – 0% per year held at \$3,254
- Budget Surplus – 5% per year

## 4.2 Chester Water Department Revenues

The CWD provided their total revenues for FY23 and FY24. Table 4-2 summarizes the FY23 and FY24 revenue stream. The non-rate revenue consists of:

- ARPA funds for grants
- Miscellaneous revenue including revenue from timber farming on CWD property
- Penalties and interest
- Retained earnings transfer
- Water liens

For projected non-rate revenue, it was assumed that there would be variability in timber sales and ARPA grant funding would not be consistent, the value is set at \$25,000 per year.

**TABLE 4-2**

Chester Water Enterprise Fund - Revenues

<b>Description</b>	<b>FY 2023 Actual</b>	<b>FY 2024 Actual</b>	<b>FY 2025 Actual</b>
Rate Revenue	\$ 122,586	\$ 137,537	\$248,700
Non-Rate Revenue	-	\$73,914	\$34,229
<b>Total Revenue</b>	<b>\$122,586</b>	<b>\$211,451</b>	<b>\$282,929</b>

## 4.3 Revenue Recommendations

The following funding scenarios were explored and have revenue recommendations provided:

- All recommended capital projects presented in Table 3-11 completed in 3 years. Year 1 consists of projects to be done in FY26-FY31, Year 2 consists of projects to be done in FY31-FY36, and Year 3 consists of projects to be done in FY36-FY41
- All recommended capital projects presented in Table 3-11 to be completed in 15 years as recommended
- All recommended capital projects presented in Table 3-11 funded through debt payments except for enterprise improvement projects done at beginning of FY27

Each scenario provides a screenshot of the capital planning schedule and dashboard that details the recommended revenue increases, yearly revenues, enterprise fund performance, and expenditures.

The following assumptions were used for the revenue recommendations:

- Projects with a cost over \$50,000 will be debt funded
- Projects with a cost under \$50,000 will be rate funded, rate funded projects are one-time payments that are paid through the enterprise fund
- Debt funded projects have a 20-year loan term and 7% interest rate, the 7% interest rate is the average interest rate for municipal bonds
- The cost of permitting, constructing, and operating a new potential ground water source was not included in this analysis

- Revenue increases are not reflective of rates and is the percentage of additional revenue the CWD needs to generate
- No grant funding was included in the revenue evaluation. If grant funding is awarded it could reduce the requirement for revenue increases
- All future non-rate revenues were held at \$25,000 to account for variabilities in the non-rate revenue year by year.
- The goal of the revenue increase is to provide CWD with 1 month of operating expenses as retained earnings for FY26. It is recommended that at a minimum 3 months of operating expenditure should be set aside. In all fiscal years after FY26 the 3-month minimum was maintained.

Full printouts of the model dashboards with revenue recommendations, projected expenditures, and cash standing as well as capital improvement plan schedules are provided in Appendix Q.

**APPENDIX A –  
HORIZONTAL ASSET INVENTORY**

# Horizontal Inventory

Pipe ID	Street	Pipe Material	Pipe Size (in)	Pipe Length (ft)	Year Installed	Pipe Age	Remaining Useful Life	Overall POF Score	Rounded POF Score	Overall COF Score	Rounded COF Score	Risk Score	Risk	Strategy
1	Huntington Road - 476 Route 20 South	Copper	2	228		Unknown	Unknown	3.1	3	1.5	2	4.69	Low	Opportunistic Investigation
2	Huntington Road - 475 Route 20 South	Copper	2	203		Unknown	Unknown	3.1	3	1.3	1	3.91	Low	Opportunistic Investigation
3	Huntington Road - Bay State Dr. to 475 Route 20	AC	6	2194		Unknown	Unknown	4.5	5	3.5	4	15.75	Immediate	Critical Investigation
4	Baystate Drive - South	AC	8	2004		Unknown	Unknown	4.5	5	4.3	4	19.13	Immediate	Critical Investigation
5	Baystate to Emery	Copper	2	652		Unknown	Unknown	3.0	3	1.3	1	3.75	Low	Opportunistic Investigation
6	Baystate Drive - North	CI	8	1355		Unknown	Unknown	3.8	4	4.3	4	15.94	High	Priority Investigation
7	Baystate to Emery Mill	CI	4	1048		Unknown	Unknown	3.8	4	1.8	2	6.56	Low	Opportunistic Investigation
8	Huntington Road - 327 Route 20	Copper	0.75	209		Unknown	Unknown	3.0	3	1.5	2	4.50	Low	Opportunistic Investigation
9	Huntington Road - Bay State Dr. to 323 Route 20	DI	8	470	2011	14	96	1.5	2	4.3	4	6.38	Low	Priority Maintenance
10	Huntington Road - 278 Route 20 to Bay State Dr	DI	8	696	2011	14	96	1.5	2	4.3	4	6.38	Low	Priority Maintenance
12	Huntington Road - Town Rd to 278 Route 20	DI	8	955	2011	14	96	1.5	2	4.3	4	6.38	Low	Priority Maintenance
13	Huntington Road - Hampden St to 278 Route 20	AC	8	939		Unknown	Unknown	4.5	5	4.3	4	19.13	Immediate	Critical Investigation
14	Hampden Street	DI	8	2301	2011	14	96	1.6	2	4.3	4	6.91	Low	Priority Maintenance
15	Hampden Street	DI	8	267	2014	11	99	1.6	2	4.0	4	6.50	Low	Priority Maintenance
17	Town Road	Copper	2	582		Unknown	Unknown	3.1	3	1.0	1	3.13	Low	Opportunistic Investigation
18	Huntington Road - Main St to Hampden St	DI	8	788	2010	15	95	1.6	2	4.0	4	6.50	Low	Priority Maintenance
19	West Main Street - Hampden St to William St	DI	8	1070	2010	15	95	1.6	2	4.5	5	7.31	Low	Priority Maintenance
20	Reservoir Drive - 8"	DI	8	2388	1995	30	80	2.4	2	4.5	5	10.69	Medium	Priority Maintenance
21	Reservoir Drive - 6"	DI	6	2386	1990	35	75	2.4	2	3.5	4	8.31	Low	Priority Maintenance
22	West Main Street - west of Cemetery Rd	DI	6	830	1990	35	75	2.5	3	3.3	3	8.13	Low	Priority Maintenance
23	Cemetery Road	DI	6	3152	1990	35	75	2.5	3	3.3	3	8.13	Low	Priority Maintenance
25	William Street	DI	6	1620	1993	32	78	2.4	2	3.3	3	7.72	Low	Priority Maintenance
26	School Street - south end	Copper	1	244		Unknown	Unknown	3.1	3	1.0	1	3.13	Low	Opportunistic Investigation
27	School Street	DI	6	372	1993	32	78	2.4	2	3.5	4	8.31	Low	Priority Maintenance
28	Middlefield Road - 6" DI	DI	6	91		Unknown	Unknown	3.1	3	3.8	4	11.72	High	Priority Investigation
29	Middlefield Road - 8" DI	DI	8	2255	2004	21	89	1.6	2	4.0	4	6.50	Low	Priority Maintenance
30	Middlefield Road - 8" AC	AC	8	1712		Unknown	Unknown	4.6	5	4.0	4	18.50	Immediate	Critical Investigation
31	Middlefield Road - 8" north	Unknown	8	1411		Unknown	Unknown	3.1	3	4.3	4	13.28	High	Priority Investigation
32	Middlefield Road - 4" CI	CI	4	1402		Unknown	Unknown	3.9	4	2.0	2	7.75	Low	Opportunistic Investigation
33	Off Middlefield Road	Unknown	6	461		Unknown	Unknown	3.1	3	3.3	3	10.16	Medium	Priority Maintenance
34	Middlefield Road- 6" north	Unknown	6	116		Unknown	Unknown	3.1	3	3.5	4	10.94	High	Priority Investigation
35	Middlefield Road - 1" north	Copper	1	777		Unknown	Unknown	3.1	3	1.5	2	4.69	Low	Opportunistic Investigation
36	Olin Avenue - west end	Copper	1	108		Unknown	Unknown	3.1	3	1.3	1	3.91	Low	Opportunistic Investigation
37	Olin Avenue	CI	4	321		Unknown	Unknown	3.8	4	2.0	2	7.50	Low	Opportunistic Investigation
38	Maple Street - south of Bridge	CI	4	85		Unknown	Unknown	3.9	4	2.0	2	7.75	Low	Opportunistic Investigation
39	Main Street - Route 20 to Bridge	CI	8	247		Unknown	Unknown	3.8	4	4.3	4	15.94	High	Priority Investigation
40	Main Street - Bridge to Maple St	DI	6	247	1992	33	77	2.3	2	4.0	4	9.00	Medium	Priority Maintenance
41	Riverfront Street	DI	6	539	1993	32	78	2.3	2	3.5	4	7.88	Low	Priority Maintenance
42	Maple Street - old	CI	4	568		Unknown	Unknown	3.8	4	2.0	2	7.50	Low	Opportunistic Investigation
43	Maple Avenue	DI	6	358	1992	33	77	2.3	2	3.8	4	8.44	Medium	Priority Maintenance
44	Andrews Avenue	DI	6	213	1980	45	65	3.0	3	3.8	4	11.25	High	Priority Investigation
46	Main Street - Maple St to Prospect St	Unknown	6	655		Unknown	Unknown	3.1	3	3.5	4	10.94	High	Priority Investigation
47	Emery Street - East End	Copper	1	1069		Unknown	Unknown	3.0	3	1.5	2	4.50	Low	Opportunistic Investigation
48	Prospect Street - rail museum area	Unknown	6	351		Unknown	Unknown	3.0	3	3.5	4	10.50	Medium	Priority Investigation
49	Emery Street - West End	Unknown	6	322		Unknown	Unknown	3.1	3	3.5	4	10.94	High	Priority Investigation
50	Prospect Street	DI	6	2147	1991	34	76	2.3	2	3.8	4	8.44	Medium	Priority Maintenance
52	Soisalo Road	Copper	1	954		Unknown	Unknown	3.1	3	1.3	1	3.91	Low	Opportunistic Investigation
53	Horn Pond Line - XC	DI	6	3829	1990	35	75	2.8	3	3.5	4	9.63	Medium	Priority Investigation
54	Horn Pond Line - End	DI	6	1770	1990	35	75	2.3	2	3.5	4	7.88	Low	Priority Maintenance
55	Lower Prospect St.	Unknown	4	887		Unknown	Unknown	3.0	3	2.3	2	6.75	Low	Opportunistic Investigation
56	Prospect Street - east end of loop	Unknown	4	652		Unknown	Unknown	3.0	3	2.3	2	6.75	Low	Opportunistic Investigation
57	Between Maple and Route 20	CI	6	331		Unknown	Unknown	3.8	4	3.3	3	12.19	High	Priority Investigation
58	Between Maple and Route 20 - Inactive	CI	6	205		Unknown	Unknown	3.8	4	3.5	4	13.13	High	Priority Investigation
59	Main Street - Bridge	DI	6	225	1992	33	77	2.3	2	3.3	3	7.31	Low	Priority Maintenance
60	Maple Street - new	DI	6	567		Unknown	Unknown	3.0	3	3.5	4	10.50	Medium	Priority Investigation
61	Main Street - east of Maple	CI	4	176		Unknown	Unknown	3.8	4	2.0	2	7.50	Low	Opportunistic Investigation
62	Andrews to Maple Ave XC	DI	6	164	1992	33	77	2.3	2	3.5	4	7.88	Low	Priority Maintenance
63	Upper Prospect Street	Unknown	6	78		Unknown	Unknown	3.0	3	3.8	4	11.25	High	Priority Investigation
64	Hampden Street	CI	6	73		Unknown	Unknown	3.9	4	3.8	4	14.53	High	Priority Investigation
68	Horn Pond Line - Wade Inn Road	DI	6	2754	1990	35	75	2.8	3	3.8	4	10.31	Medium	Priority Investigation

# Horizontal Inventory

Pipe ID	Street	Pipe Material	Pipe Size (in)	Pipe Length (ft)	Year Installed	Pipe Age	Remaining Useful Life	Overall POF Score	Rounded POF Score	Overall COF Score	Rounded COF Score	Risk Score	Risk	Strategy
70	Horn Pond Line - William Holmes Road	DI	6	1391	1990	35	75	2.8	3	3.5	4	9.63	Medium	Priority Investigation
71	West Main Street - Cemetery Rd to Reservoir Dr	DI	6	725	1990	35	75	2.5	3	3.5	4	8.75	Medium	Priority Investigation
72	West Main Street - Reservoir Dr to Hampden St	DI	8	429	2010	15	95	1.6	2	4.3	4	6.91	Low	Priority Maintenance
73	West Main Street - William St to School St	DI	8	593	2010	15	95	1.6	2	4.3	4	6.91	Low	Priority Maintenance
74	West Main Street - School St to Middlefield Rd	DI	8	67	2010	15	95	1.6	2	4.3	4	6.91	Low	Priority Maintenance
76	Huntington Road - Middlefield Rd to Main St	DI	8	129	2010	15	95	1.6	2	4.3	4	6.91	Low	Priority Maintenance

**APPENDIX B –  
HORIZONTAL ASSET RECOMMENDATIONS**

**Project Location:**

Distribution System

**Project Title:**

Central Chester Leak Detection & Inspection

**Project Description**

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The following sections of line were identified as areas that are in need of leak detection: Huntington Rd, Main St, Maple St, and Middlefield Rd. These sections of lines were identified as immediate-risk or high-risk sections of line based on the asbestos cement pipe being installed in high acidic soil and the age of the lines. The lines in these areas range from 1 to 8 inches in diameter and were installed in the 1990s or the installation date is unknown. It is recommended that these sections of lines be inspected for leak detection.



**Engineer’s Opinion of Probable Cost as of 2025 for Leak Detection**

Description	Units	Qty	Unit Price	Total
Andrews Avenue	L.F.	213	\$0.6	\$128
Huntington Road	L.F.	939	\$0.6	\$563
Main Street	L.F.	719	\$0.6	\$431
Maple Street	L.F.	621	\$0.6	\$372
Middlefield Road	L.F.	5,854	\$0.6	\$3,512
Riverfront Street	L.F.	540	\$0.6	\$324
Construction Subtotal				\$5,330
<b>Estimated Total Project Cost</b>				<b>\$6,000</b>

**Project Location:**

Distribution System

**Project Title:**

Eastern Chester Leak Detection & Inspection

**Project Description**

---

The following sections of line were identified as areas that are in need of leak detection: Baystate Dr, from Baystate Dr to Emery St, and the eastern section of Huntington Rd. These sections of lines were identified as immediate-risk or high-risk sections of line based on the asbestos cement pipe being installed in high acidic soil and the age of the lines. The lines in these areas range from 2 to 8 inches in diameter and no installation dates are known. It is recommended that these sections of lines be inspected for leak detection.



**Engineer’s Opinion of Probable Cost as of 2025 for Leak Detection**

Description	Units	Qty	Unit Price	Total
Baystate Drive	L.F.	5,060	\$0.6	\$3,036
Huntington Road	L.F.	2,625	\$0.6	\$1,576
Subtotal				\$4,612
<b>Estimated Total Project Cost</b>				<b>\$5,000</b>

**Project Location:**

Distribution System

**Project Title:**

Western Chester Leak Detection & Inspection

**Project Description**

---

The following sections of line were identified as areas that are in need of leak detection: Reservoir Drive and the end of Horn Pond Line. These sections of lines were identified as high-risk sections of line based on the age of the lines. The lines in these areas range from 6 to 8 inches in diameter and were installed in the 1990s. It is recommended that these sections of lines be inspected for leak detection.



**Engineer’s Opinion of Probable Cost as of 2025 for Leak Detection**

<b>Description</b>	<b>Units</b>	<b>Qty</b>	<b>Unit Price</b>	<b>Total</b>
Horn Pond Line	L.F.	10,994	\$0.6	\$6,596
Reservoir Drive	L.F.	4,774	\$0.6	\$2,864
Subtotal				\$9,460
<b>Estimated Total Project Cost</b>				<b>\$10,000</b>

**Project Location:**

Distribution System

**Project Title:**

Annual Water Main Replacement

**Project Description**

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To address both the replacement of water mains identified through leak detection and those approaching the end of their service life, the Town should allocate funding to replace at least 1% of the existing cast iron, asbestos cement (AC), and unidentified piping each year. It is estimated that this annual replacement rate will require a budget of approximately \$67,000. Priority should be given to the replacement of high-risk AC, cast iron, and unknown water mains. To optimize costs and implementation efficiency, the Town may consider bundling annual replacements into larger capital projects supported by bond financing.

**Engineer’s Opinion of Probable Cost as of 2025 for Replacement**

<b>Description</b>	<b>Units</b>	<b>Qty</b>	<b>Unit Price</b>	<b>Total</b>
Annual Water Main Replacement	Annual	1	\$67,000	\$67,000
Subtotal				\$67,000
<b>Estimated Total Project Cost</b>				<b>\$67,000*</b>

\*The project cost is based on the present worth of the watermain replacement and will likely be more expensive each year with inflation and changes in the construction market.

**APPENDIX C –  
VERTICAL ASSET INVENTORY**

Vertical Asset Inventory - General/Process

Facility	Room	Asset Type	Asset	Quantity	Manufacturer Name	Model Number	Serial Number	Design Parameters	Year of Install	Asset Name - Service Life	Expected Service Life (Years)	Overall POF Score	Overall COF Score	Risk Score	Overall Risk
Austin Brooks Reservoir	01 - Screening House	Civil/Site Safety & Security	Screen Hoist	1					1997	Hoist	35	3.1	1.5	4.6	High
Austin Brooks Reservoir	01 - Screening House	Civil/Site Safety & Security	Raw Water Screens	2					1997	Manual Screen	35	3.1	1.5	4.6	High
Chester Water Treatment Plant	01 - Screening House	Residuals Management	Gate House Screens	8				72"x26" total, 65"x18.5" screen	1997	Manual Screen	10	3.3	1.3	4.1	High
Chester Water Treatment Plant	02 - Raw Water Pumping Room	Distribution Pumps	Raw water pump 1	1	Price Pumps	35A013Q130H3	W1212205885	3HP, 230/460V, 3450/2850RPM	1997	Centrifugal Pump	35	2.4	2.8	6.5	High
Chester Water Treatment Plant	02 - Raw Water Pumping Room	Distribution Pumps	Raw water pump 2	1	Price Pumps	35A013Q130H3	W1212206010	3HP, 230/460V, 3450/2850RPM	1997	Centrifugal Pump	20	2.6	2.8	7.2	High
Chester Water Treatment Plant	02 - Raw Water Pumping Room	Distribution Pumps	Raw water pump 3	1	Price Pumps	35A013Q130H3	W1711015435	3HP, 230/460V, 3450/2850RPM	1997	Centrifugal Pump	20	3.1	2.8	8.6	High
Chester Water Treatment Plant	03 - Process Room	Instrumentation/Monitoring	Turbidimeter	1	Hach	TU5300 sc	2278607	0.01 NTU from 0-40 NTU accuracy, 100-1000 mL/min sample flow rate	2022	Turbidimeter	20	1.1	2.6	3.0	Low
Chester Water Treatment Plant	03 - Process Room	Instrumentation/Monitoring	Pressure Transmitter	1	Rosemount	8732EST1A1N0M4	860254475	90-250VAC, 50/60Hz, 40 VA Max	2022	General Meter	30	1.1	2.0	2.2	Low
Chester Water Treatment Plant	03 - Process Room	Instrumentation/Monitoring	Valve Actuator	2	Limitorque	QX-2	126222	8-30 seconds for 90 degrees, 250 ft-lbs rated torque, 0.26 HP, 0.18 kW	2022	Electric Valve Actuator	10	1.4	2.0	2.7	Low
Chester Water Treatment Plant	03 - Process Room	Instrumentation/Monitoring	Chlorine Controller/Analyzer	1	Hach	SC4500	2199220	100-240 VAC, 50/60Hz, 1A	2022	Controller	10	1.4	1.9	2.6	Low
Chester Water Treatment Plant	03 - Process Room	Chemical Treatment Systems	Sodium Hypochlorite Chemical Tanks	1					2022	Chemical Tank	10	1.4	2.3	3.1	Medium
Chester Water Treatment Plant	03 - Process Room	Chemical Treatment Systems	Sodium Hydroxide Chemical Tanks	1					2022	Chemical Tank	60	1.1	2.3	2.5	Low
Chester Water Treatment Plant	03 - Process Room	Residuals Management	Rotary Vane Septic Air Pump	1	Gast	1023-V131Q-SG608X	1023-V131Q-G608NGX 4F742A	Rated 10 PSI	1997	Rotary Lobe Pump	60	1.4	1.5	2.0	Low
Chester Water Treatment Plant	03 - Process Room	Chemical Treatment Systems	Sodium Hydroxide Chemical Dosing Pump	1	Pulsafeeder	7033LVHX	11/22.1208168		2022	Peristaltic Pump	10	1.4	2.8	3.8	Medium
Chester Water Treatment Plant	03 - Process Room	Chemical Treatment Systems	Sodium Hypochlorite Chemical Dosing Pump	2	Pulsafeeder	7033LVHX	11/22.1208167		2022	Peristaltic Pump	25	1.1	2.8	3.1	Medium
Chester Water Treatment Plant	03 - Process Room	Filtration	Jet Pump	1	Goulds Water Technology	C48AA33A06	28621CH	3/4HP, 115/230V, 3450RPM, 60Hz	1997	Other Pump	10	2.1	1.9	4.0	Medium
Chester Water Treatment Plant	03 - Process Room	Residuals Management	Valve Actuator	1	Limitorque	QX-2	L1247233	8-30 seconds for 90 degrees, 250 ft-lbs rated torque, 0.26 HP, 0.18 kW	2022	Electric Valve Actuator	50	1.1	1.5	1.6	Not Applicable
Chester Water Treatment Plant	03 - Process Room	Instrumentation/Monitoring	pH Transmitter	1	Analytical Technology	Q4S			2022	pH Meter	25	1.1	1.8	2.0	Not Applicable
Chester Water Treatment Plant	03 - Process Room	Instrumentation/Monitoring	Filter 3 Differential Pressure Transmitter	1	Pioneer Controls, Inc	DPT 237	9644 10102854001		2022	Sensor	10	1.4	1.8	2.4	Low
Chester Water Treatment Plant	03 - Process Room	Instrumentation/Monitoring	Magnetic Flow Meter Transmitter	1	Emerson Rosemount	8750	0860254475 21363257		2022	Flow Meter	25	1.1	1.8	2.0	Not Applicable

Vertical Asset Inventory - General/Process

Facility	Room	Asset Type	Asset	Quantity	Manufacturer Name	Model Number	Serial Number	Design Parameters	Year of Install	Asset Name - Service Life	Expected Service Life (Years)	Overall POF Score	Overall COF Score	Risk Score	Overall Risk
Chester Water Treatment Plant	03 - Process Room	Civil/Site Safety & Security	Raw Water Pump Control Panel	1	Honeywell	numerous	numerous		2022	Controller	10	1.4	1.3	1.7	Not Applicable
Chester Water Treatment Plant	04 - Clearwell	Water Storage	Clearwell	1					1997	Tank	20	2.1	2.8	5.8	High
Chester Water Treatment Plant	04 - Clearwell	Filtration	Sand Filter Tanks	3					1997	Tank	10	2.1	2.3	4.8	High
Chester Water Treatment Plant	04 - Clearwell	Filtration	Sand Filters	3					1997	Filter	10	2.0	2.3	4.5	High
Chester Water Treatment Plant	04 - Clearwell	Filtration	Filter Flow Valves	3					1997	Pressure Regulator	20	2.6	2.3	5.9	High
Chester Water Treatment Plant	06 - Gate House 2	Residuals Management	Gate House Screens	2					1997	Manual Screen	30	3.4	1.3	4.2	High
Chester Water Treatment Plant	07 - Finish Sample	Instrumentation/Monitoring	Universal Controller	2	Hach	SC4500		100-240 VAC, 50/60Hz, 1A	2022	Controller	20	1.1	2.6	3.0	Low
Chester Water Treatment Plant	07 - Finish Sample	Civil/Site Safety & Security	Dust Cap	1			105010 P1109187000	4" size	1997	Filter	20	2.1	1.4	2.9	Low
Chester Water Treatment Plant	07 - Finish Sample	Civil/Site Safety & Security	Finish sample building standby generator	1	Generac	Guardian 8kW			1997	Electric Generator	20	2.1	1.3	2.7	Low
Chester Water Treatment Plant	07 - Finish Sample	Instrumentation/Monitoring	pH Analyzer	1		Q4S	07-0092-0918	AJI	2022	pH Meter	10	1.4	2.3	3.1	Medium
Chester Water Treatment Plant	10 - Site	Civil/Site Safety & Security	Access Hatch	6	Halliday				1997	Structure	25	2.1	1.8	3.7	Medium
Chester Water Treatment Plant	11 - Other	Civil/Site Safety & Security	Control room backup generator	1	Cummins Onan	35EK	I960616065	60Hz, 1800RPM	1997	Electric Generator	20	2.1	1.5	3.2	Medium
Chester Water Treatment Plant	11 - Other	Civil/Site Safety & Security	Generator Engine Control Unit	1	Woodward	8405-210	11535952		1997	Flow Meter	30	1.8	1.5	2.6	Low
Chester Water Treatment Plant	11 - Other	Civil/Site Safety & Security	Control room backup generator engine	1	Ford Power Products	CSG-6491-6005-A	22040 H-22-RK		1997	Engine	25	2.1	1.5	3.2	Medium
Chester Water Treatment Plant	11 - Other	Instrumentation/Monitoring	SCADA System	1					2022	Controller	25	1.1	1.8	2.0	Not Applicable
Chester Water Treatment Plant	12- Control Room	Instrumentation/Monitoring	Standby Generator			22040 H-22-R10			1997	Electric Generator	35	1.8	1.8	3.1	Medium

Vertical Asset Inventory - Electrical

Facility	Room	Asset Type	Asset	Additional Asset Components	Quantity	Manufacturer Name	Model Number	Serial Number	Design Parameters	Year of Install	Asset Name - Service Life	Expected Service Life (Years)	Overall POF Score	Overall COF Score	Risk Score	Overall Risk
Chester Water Treatment Plant	05 - Gate House 1	Distribution equipment	Panelboard	NA	1				100A Mains, 100A MCB 1PH, 120/240V, 16 Ckts	2008	Power Distribution	30	2.1	3.1	2.6	Low
Chester Water Treatment Plant	05 - Gate House 1	Distribution equipment	Transfer Switch (Service Entra	NA	1	Generac	RTS Serites	NA	100A Rated, 1PH, 120/240V	2008	Power Distribution	30	2.1	3.1	2.6	Low
Chester Water Treatment Plant	05 - Gate House 1	Distribution equipment	Generator	NA	1	Generac	NA	NA	8kW Propane Gen	2008	Power Distribution	30	2.1	3.1	2.6	Low
Chester Water Treatment Plant	05 - Gate House 1	Lighting	Lighting Fixtures	NA	3	NA	NA	NA	eilind Surface Mounted 3-4ft Long and (1) Exterior Wall	2008	Lighting	25	2.1	2.5	2.3	Low
Chester Water Treatment Plant	10 - Site	Distribution equipment	Electrical Service Meter Socket	Grounding and Conduit	1	Milbank	NA	NA	100A Rated, 1PH	1995	Power Distribution	30	3.5	3.1	3.3	Medium
Chester Water Treatment Plant	10 - Site	Distribution equipment	ier) Main Service Disconnect S	NA	1	Square D	GD		100A, 240V, 1PH	1995	Power Distribution	30	4.1	3.1	3.6	Medium
Chester Water Treatment Plant	10 - Site	Lighting	Site Lighting	Receptacle and Toggle Switch, PC	1	NA	NA	NA	ype - Approxi 14ft Tall. WP Receptacle and Toogle Switc	2010	Lighting	25	2.7	2	2.3	Low
Chester Water Treatment Plant	11 - Other	Control Panels	Raw Water' Pump Control Pane	NA	1	NA	NA	NA	(3) HOA, (3) Run Light Indicators, (3) Hour metering, f	1995	Pump Control Panel	20	3.0	2.8	2.9	Low
Chester Water Treatment Plant	11 - Other	Lighting	Lighting Fixtures	NA	34	NA	NA	NA	ndant mounted for damp and wet locations. (1) Exterio	1995	Lighting	25	2.9	1.6	2.1	Low
Chester Water Treatment Plant	11 - Other	Lighting	Emergency Battery Units	NA	2	NA	NA	NA	2-Head Lamp EBUs	1995	Lighting	25	2.9	2	2.4	Low
Chester Water Treatment Plant	11 - Other	Lighting	Exit Signs	NA	2	NA	NA	NA	Illuminated Exit Signs for Damp/Wet Locations	1995	Lighting	25	4.1	2	2.9	Low
Chester Water Treatment Plant	12 - Electrical/Control Room	Distribution equipment	ain Service Disconnect Switch	NA	1	General Electric	NP157800d	NA	100A, 240V, 1PH	2004	Power Distribution	30	2.1	3.1	2.6	Low
Chester Water Treatment Plant	12 - Electrical/Control Room	Distribution equipment	Automatic Transfer Switch	NA	1	Cummins - Onan	OTECA-A040C962	I21M976142	125A, 240V, 3P, 1PH	1995	Power Distribution	30	2.7	3.1	2.9	Low
Chester Water Treatment Plant	12 - Electrical/Control Room	Distribution equipment	Panel LP Disconnect Switch	NA	1	General Electric	NP1578000A	NA	60A, 240V, 1PH	1995	Power Distribution	30	2.7	3.1	2.9	Low
Chester Water Treatment Plant	12 - Electrical/Control Room	Distribution equipment	' Pump Control Panel Disconn	NA	1	General Electric	NP1578000A	NA	60A, 240V, 1PH	1995	Power Distribution	30	2.7	3.1	2.9	Low
Chester Water Treatment Plant	12 - Electrical/Control Room	Distribution equipment	35kW NG Standby Generator	Battery Charger, Gen CB, Block heater	1	Cummins - Onan	35EK	I960616065	35 kW Propane Gen, 120/240V, 1PH, 100A CB	1995	Power Distribution	30	2.7	3.1	2.9	Low
Chester Water Treatment Plant	12 - Electrical/Control Room	Distribution equipment	Panelboard LP	Surge Protector	1	General Electric	A Series AQF1421ABX	162-DM49340	125A Mains, 60A MCB, 120/240V, 1PH, 10KAIC, SPD	1995	Power Distribution	30	2.7	3.1	2.9	Low

Vertical Asset Inventory - Mechanical/HVAC

Facility	Room	Asset	Additional Asset Components	Quantity	Manufacturer Name	Model Number	Serial Number	Design Parameters	Year of Install	Recommendation	Did you talk to the operator about this asset?	Overall Physical Condition	Expected Service Life (Years)	Overall POF Score	Overall COF Score	Risk Score	Overall Risk
Chester Water Treatment Plant	03 - Process Room	Exhaust Fan	Process Room	1	Centri Master	PNU135MLE	NUA45150	.25 HP	2004	Replace with DOAS to handle humidity problem.	No	Poor	15	5.0	1.9	3.1	Medium
Chester Water Treatment Plant	03 - Process Room	Exhaust Fan	Generator room	1	Centri Master	PNU165WIG	XUA451502	.5 HP	2004	Replace in-kind	No	Poor	15	5.0	1.9	3.1	Medium
Chester Water Treatment Plant	03 - Process Room	Intake Louver	Generator room	1				24x24	2004	Replace in-kind	No	Poor	25	4.5	2.0	3.0	Medium
Chester Water Treatment Plant	03 - Process Room	Exhaust Louver	Generator room	1				24x24	2004	Replace in-kind	No	Poor	25	2.2	2.0	2.1	Low
Chester Water Treatment Plant	03 - Process Room	Hand-Off-Auto	Generator room	2					2004	Replace in-kind	No	Poor	15	4.0	2.1	2.9	Low
Chester Water Treatment Plant	03 - Process Room	Gas Unit Heater	Generator room	1				16 mbh	2018	Replace in-kind	No	Good	12	1.4	1.0	1.2	Not Applicable
Chester Water Treatment Plant	03 - Process Room	Gas Unit Heater	Process Room	1				16 mbh	2018	Replace in-kind	No	Good	12	1.4	1.0	1.2	Not Applicable
Chester Water Treatment Plant	03 - Process Room	Intake Louver	Process Room	1				24x24	2004	Replace in-kind	No	Poor	25	4.0	1.1	2.1	Low
Chester Water Treatment Plant	03 - Process Room	Gas Unit Heater	Process Room	1				16 mbh	2004	Replace in-kind	No	Poor	12	4.0	1.1	2.1	Low
Chester Water Treatment Plant	03 - Process Room	Generator Exhaust	Generator room	1				4" exhaust	2004	Replace in-kind.	No	Poor	20	3.1	2.1	2.6	Low
Chester Water Treatment Plant	03 - Process Room	CW Piping	Building	1				1" piping	2004	Replace in-kind.	No	Poor	30	2.0	2.0	2.0	Not Applicable
Chester Water Treatment Plant	03 - Process Room	Gas Piping	Building	1				1.5" piping	2004	Replace in-kind.	No	Fair	30	2.0	1.8	1.9	Not Applicable
Chester Water Treatment Plant	05 - Gate House 1	Electric Fin Tube	Building	1				3KW	2008	Replace in-kind.	No	Poor	10	3.7	2.8	3.2	Medium
Chester Water Treatment Plant	05 - Gate House 1	Sump Pump	Building	1				1/4 HP	2008	Replace in-kind.	No	Poor	10	3.7	2.8	3.2	Medium
Chester Water Treatment Plant	10 - Site	Propoane tank	Building	1				500 Gallon Tank	2004	Replace in-kind.	No	Fair	25	2.2	1.0	1.5	Not Applicable

Vertical Asset Inventory - Structural

Facility	Room	Asset Type	Asset	Additional Asset Components	Quantity	Dimensions	Year of Install	Recommendation	Overall Physical Condition	Expected Service Life (Years)	Overall POF Score	Overall COF Score	Risk Score	Overall Risk
Chester Water Treatment Plant	03 - Process Room	Load bearing	Drum Storage	Discoloration, build up of chemicals	4	Roughly 3' x 3'	1995	Upgrade equipment	Moderate	30	2.4	2.4	2.4	Low
Chester Water Treatment Plant	03 - Process Room	Architectural	Pipe Baseplates	Discoloration/Rust	Around 20-30	Approx 1'x6"	1995	Replace in kind	Poor	30	4	1.6	2.5	Low
Chester Water Treatment Plant	03 - Process Room	Primary structural	Wooden Platform above clearwell	Not to code, discoloration in parts. Structurally seems intact	1	Approx 6'x15'	1995	Upgrade equipment	Good	40	2.8	4	3.3	Medium
Chester Water Treatment Plant	03 - Process Room	Primary structural	Railings connected to wooden platform	Not to code using chains. Steel units typical wear and tear, unit is a bit shaky	1	Roughly 15' strip	1995	Upgrade equipment	Moderate	50	3.4	3.6	3.5	Medium
Chester Water Treatment Plant	03 - Process Room	Secondary structural	Clearwell Ladder	Very shaky, rungs and unit has large material build up, material coating on rungs, needs powerwash very dirty. Not back support to ladder, opening not to code	1	16.5 ft tall	1995	Upgrade equipment	Moderate	50	3.4	3.8	3.6	Medium
Chester Water Treatment Plant	03 - Process Room	Primary structural	Concrete Floor	Typical map cracking, discoloration, worn out resistant coating, discoloration, rust	1	Roughly 1050 sqft	1995	Rehab / Repair As Needed	Good	70	2.2	1.8	2.0	Not Applicable
Chester Water Treatment Plant	03 - Process Room	Primary structural	Ceiling	Good, no observable water leakage or discoloration	1	Roughly 1050 sqft	1995	Rehab / Repair As Needed	Good	70	2	1.8	1.9	Not Applicable
Chester Water Treatment Plant	03 - Process Room	Primary structural	Interior Walls	Some discoloration, discoloration near pipe supportd		Perimeter of Process Room	1995	Rehab / Repair As Needed	Good	70	2	1.8	1.9	Not Applicable
Chester Water Treatment Plant	03 - Process Room	Secondary structural	Louver	Rust/discoloration	1	Roughly 3'x2'	1995	Rehab / Repair As Needed	Good	50	2.2	1.6	1.9	Not Applicable
Chester Water Treatment Plant	03 - Process Room	Secondary structural	Access Hatches	Discoloration, typiacal map cracking in concrete, some chipped corners, loss of protective paint/coating	3	Aprox. 3'x3'	1995	Rehab / Repair As Needed	Good	70	2	1.6	1.8	Not Applicable
Chester Water Treatment Plant	03 - Process Room	Architectural	Cabinets	Typical discoloration/wear and tear.	1	Approx 10'x2'x2.5'	1995	Rehab / Repair As Needed	Good	50	1.6	1.4	1.5	Not Applicable
Chester Water Treatment Plant	03 - Process Room	Architectural	Laboratory Sink	Typical discoloration/wear and tear.			1995	Rehab / Repair As Needed	Good	50	1.6	1.4	1.5	Not Applicable
Chester Water Treatment Plant	04 - Clearwell	Architectural	Pipe Baseplates	Discoloration/Rust	Around 20-30	Approx 1'x6"	1995	Replace in kind	Poor	30	4	1.6	2.5	Low
Chester Water Treatment Plant	04 - Clearwell	Architectural	Shelving	Discoloration/Rust. Doesn't seem stable, well over due for new unit	1		1995	Replace in kind	Poor	20	4	1.6	2.5	Low
Chester Water Treatment Plant	04 - Clearwell	Primary structural	Concrete Floor	Typical mapcracking, very dirty. Lots of rust, discoloration, and staining.		Aprox 27' x 6'. Thickness of slab unknown	1995	Rehab / Repair As Needed	Moderate	70	2.2	1.8	2.0	Not Applicable
Chester Water Treatment Plant	04 - Clearwell	Primary structural	Concrete Walls	Typical map cracking, some discoloration. Structurally sound		16.5ft x 27' and 16.5' x 6', 1' thick walls	1995	Rehab / Repair As Needed	Good	70	2	1.8	1.9	Not Applicable
Chester Water Treatment Plant	04 - Clearwell	Primary structural	Concrete Ceiling	Some discoloration, will have to work with new grating unit where ladder is	1	6'x12', thickness assumed 6" slab.	1995	Rehab / Repair As Needed	Good	70	2	1.8	1.9	Not Applicable
Chester Water Treatment Plant	04 - Clearwell	Architectural	Light Fixtures	Current lighting supports still stable and strong, may need additional with the the wood framing being removed			1995	Replace in kind	Good	40	2.6	1.6	2.0	Low

Vertical Asset Inventory - Structural

Facility	Room	Asset Type	Asset	Additional Asset Components	Quantity	Dimensions	Year of Install	Recommendation	Overall Physical Condition	Expected Service Life (Years)	Overall POF Score	Overall COF Score	Risk Score	Overall Risk
Other	05 - Gate House 1	Safety concerns	Runoff to River	No safety fence or barrier, no areas to hook on to			1968	New engineering solution recommended	Poor		4.4	3.8	4.1	High
Other	05 - Gate House 1	Primary structural	Foundation Wall /Top Slab beneath Gate House Building	Large Visiable Cracking, Gaps, and Loss of Concrete. Large amounts of efflorescence. Cracking goes under the foundation of the shed. Not Safe		8'x3'x12"	1968	Replace in kind	Poor	70	4	4.4	4.2	High
Other	05 - Gate House 1	Load bearing	Monorail Support	Not to code, nails missing, lumber warped, missing support			1968	Replace with new system	poor	50	4.2	4.4	4.3	High
Other	05 - Gate House 1	Load bearing	Monorail	Not to code, support id failing, will fail if support goes out, rust on unit, discoloration, and chains worn down			1968	Replace with new system	moderate	50	4	4.4	4.2	High
Other	05 - Gate House 1	Primary structural	Interior Walls	Discoloration, wear and tear. Some wood framing/2x4's more worn down then others.			1968	Rehab / Repair As Needed	Moderate	50	3.2	2.6	2.9	Low
Other	05 - Gate House 1	Primary structural	Exterior Walls	Vinly sidings has discoloration and typical wear and tear. Build up of algae.			1968	Replace in kind	Moderate	50	3	2.6	2.8	Low
Other	05 - Gate House 1	Primary structural	Ceiling	Framing is worn down, nails missing, discoloration, in need for renovation			1968	Replace in kind	moderate	35	3.2	2.6	2.9	Low
Other	05 - Gate House 1	Architectural	Windows	Typical wear and tear, discoloration around frames, could use replacements			1995	Replace in kind	moderate	30	3.2	1.6	2.3	Low
Other	05 - Gate House 1	Secondary structural	Gate House on River Wooden Platform	Not up to code, some discoloration	1	3 connected 2x4's	1968	Upgrade equipment	Moderate	40	3.8	3	3.4	Medium
Other	05 - Gate House 1	Architectural	Wooden Doors	No weather Strippings, Framing is worn down. Door is moderate, wood door is out date. Replace with steel.	2	Single Door	1968	Replace in kind	Moderate	30	3.8	2.4	3.0	Medium
Other	05 - Gate House 1	Primary structural	Roofing	Shingles worn, discoloration, in need for replacement			1968	Replace in kind	moderate	35	3.8	2.6	3.1	Medium
Other	05 - Gate House 1	Secondary structural	Outside Platform	Not to code, no railing, discoloration, algae build up, failing side wall concrete, needs to be replaced.			1968	Replace with new system	poor	50	4.2	3.8	4.0	Medium
Other	05 - Gate House 1	Primary structural	Floor	Typical map cracking and discoloration, some chips near man hole openings			1995	Rehab / Repair As Needed	good	70	2	1.8	1.9	Not Applicable
Other	11 - Other	Primary structural	Ceiling	Leaks in the panel board, not to code, missing tape, needs replacement			1995	Replace with new system	poor	30	4.8	3.6	4.2	High
Other	11 - Other	Load bearing	Electrical/Control Room Concrete Generator Pad	Minor Map cracking, chipping loss on edges. Typical wear	1	Roughly 6' x 3' x 3"	1995	Rehab / Repair As Needed	Good	70	2	2.2	2.1	Low
Other	11 - Other	Secondary structural	Electrical/Control Room Interior Floor	Floor has minor map cracking which is typical. Could use new floor coating	1	Roughly 12' x 22'	1995	Rehab / Repair As Needed	Moderate	20	3	1.8	2.3	Low
Other	11 - Other	Primary structural	Electrical/Control Room Exterior CMU Wall	Some Discoloration on top near Metal Chain Link Fence, minor discoloration on the side wall, minor cracking from over time, minor wear and tear	2	Front wall:Approx. 56' x 20.5' Side Wall: Arox 27' x 20.5'~16'	1995	Rehab / Repair As Needed	Good	70	2	3.2	2.5	Low
Other	11 - Other	Secondary structural	Electrical/Control Room Exterior CMU Heat Vent (EF-2)	Not being properly used, camera installed outside on unit needs to be removed	1	Approx 3' x 3'	1995	Rehab / Repair As Needed	Moderate	50	2	2.4	2.2	Low

Vertical Asset Inventory - Structural

Facility	Room	Asset Type	Asset	Additional Asset Components	Quantity	Dimensions	Year of Install	Recommendation	Overall Physical Condition	Expected Service Life (Years)	Overall POF Score	Overall COF Score	Risk Score	Overall Risk
Other	11 - Other	Secondary structural	Electrical/Control Room Exterior Deck	Map cracking in concrete, Efflorescence on some side walls, discoloration, typical wear	1	Approx 6' x 12' x 4.5' tall	1995	Rehab / Repair As Needed	Good	70	2	2	2.0	Low
Other	11 - Other	Safety concerns	Electrical/Control Room Exterior Deck Bumpers	Discoloration on units, rust build up, possible missing bumper, 3 out of 4 bolts left exposed in concrete wall	3	Approx 2' x 1'	1995	Upgrade equipment	Moderate	40	3	1.8	2.3	Low
Other	11 - Other	Secondary structural	Electrical/Control Room Exterior Deck Stairs	Discoloration, hairline cracking, missing stripping , chips on corners and cracks	7 steps	5'6 x 3'6	1995	Rehab / Repair As Needed	Moderate	70	2.6	2.2	2.4	Low
Other	11 - Other	Secondary structural	Electrical/Control Room Exterior Deck Stair Railings	Rust/discoloration	2 railings	5'6	1995	Replace in kind	Moderate	40	3	2.2	2.6	Low
Other	11 - Other	Primary structural	Exterior Expansion Joint Connecting Exterior Face of Filter 1 CMU (West Side) and Electrical/Control Room Exterior	Discoloration along the joint, some efflorescence and cracking	1	Roughly 2' x 14'	1995	Rehab / Repair As Needed	Moderate	70	2.6	3.2	2.9	Low
Other	11 - Other	Architectural finishes	Exterior CMU Wall around Filter One (West Side)	Visible Cracking, Discoloration, large amounts of efflorescence chipped corners	1	49' x 14' x 12"	1995	Rehab / Repair As Needed	Poor	60	3.4	1.8	2.5	Low
Other	11 - Other	Architectural finishes	Exterior CMU Wall around Filter One to Filter 3 (North Face)	Visible Cracking, Discoloration, large amounts of efflorescence chipped corners	1	50x14'x12"	1995	Rehab / Repair As Needed	Poor	60	3.4	1.8	2.5	Low
Other	11 - Other	Primary structural	Filter Basins Top Slab	Typical map Cracking, slight discoloration near fence posts	1	50' x 49'	1995	Rehab / Repair As Needed	Good	70	2	2.8	2.4	Low
Other	11 - Other	Primary structural	Control Building Membrane Roof	Typical Wear and tear. Some area's hold water puddles on top. Possible air leakage. Some unevenness along top.	1	55' x 27'	1995	Rehab / Repair As Needed	Good	50	2.2	2.6	2.4	Low
Other	11 - Other	Architectural	Filter Basin & Control Building Wire Fence	Typical wear and tear and rusting on fencing	1	Perimeter of top slab/roof	1995	Rehab / Repair As Needed	Moderate	50	2.2	2	2.1	Low
Other	11 - Other	Primary structural	Roofing	Side framing coming undone, some water leakage from inside view, due for replacement		Roughly 15'x20'	1995	Replace with new system	Moderate	35	3	2.8	2.9	Low
Other	11 - Other	Architectural	Exterior Door	Discoloration, framing missing bottom section/corroded, weather stripping corroded, paint loss			1995	Replace in kind	poor	30	4	1.6	2.5	Low
Other	11 - Other	Primary structural	Concrete Flooring	Discoloration, map cracking. Needs new coat of protective coating			1995	Upgrade equipment	moderate	70	2.2	2	2.1	Low
Other	11 - Other	Architectural	Pipe Railing	Rusted and corroded, not to code			1995	Replace with new system	moderate	50	2.6	2.8	2.7	Low
Other	11 - Other	Architectural	Wooden Railings	Not to Code			1995	Replace with new system	moderate	40	3	2.8	2.9	Low
Other	11 - Other	Primary structural	Electrical/Control Room Interior CMU Walls	Minor Paint Loss/Sealant loss around wall/ceiling edges	4	Roughly 12' x 14', and 22'x14'	1995	Rehab / Repair As Needed	Good	70	2	4	2.8	Medium
Other	11 - Other	Primary structural	Electrical/Control Room Interior Ceiling	Minor Paint Loss/Discoloration	1	Roughly 12' x 22'	1995	Rehab / Repair As Needed	Good	40	2.4	4	3.1	Medium
Other	11 - Other	Secondary structural	Electrical/Control Room Exterior Deck Handrails	Discoloration, missing removable systems, chain link not up to code	3 sides of dock	Outside perimeter of Dock, around 20.5' of perimeter	1995	Upgrade equipment	Poor	40	4	2.8	3.3	Medium

Vertical Asset Inventory - Structural

Facility	Room	Asset Type	Asset	Additional Asset Components	Quantity	Dimensions	Year of Install	Recommendation	Overall Physical Condition	Expected Service Life (Years)	Overall POF Score	Overall COF Score	Risk Score	Overall Risk
Other	11 - Other	Secondary structural	Filter Basins Top Slab Access Hatch/Access Hatch Concrete Curb	Typical Map cracking on faces, algae/moss growth, some cracked edges of some units, efflorescences on sections	6	4'3" x 6' x 1.5'	1995	Rehab / Repair As Needed	Good	70	2.4	3.8	3.0	Medium
Other	11 - Other	Architectural	Filter Basin & Control Building Light	Cracking/ broken light cover	1		1995	Replace in kind	poor	25	4.6	2.2	3.2	Medium
Other	11 - Other	Secondary structural	Generator Building Concrete Barrier	Large section loss at top of the barrier, rebar exposed.			1995	Replace in kind	Fail	70	4.4	2.4	3.2	Medium
Other	11 - Other	Primary structural	Generator Building CMU Interior Walls	Missing sections of insulation, open panels, discoloration, loss of paint, not to code			1995	Replace with new system	poor	30	3.8	3	3.4	Medium
Other	11 - Other	Primary structural	Wooden Platform	Not to Code			1995	Replace with new system	moderate	40	3	3.6	3.3	Medium
Other	11 - Other	Primary structural	Stairs	Missing railings, to large of gaps, not to code			1995	Replace with new system	poor	40	3.6	3.2	3.4	Medium
Other	11 - Other	Architectural	Electrical/Control Room Interior Double Door	Minor Paint Loss/Discoloration on doors, weatherstripping, and frames	1	Roughly 6' x 6'8"	1995	Rehab / Repair As Needed	Excellent	70	2	1.8	1.9	Not Applicable
Other	11 - Other	Architectural	Electrical/Control Room Exterior Double Door	Minor Paint Loss/Discoloration on doors, weatherstripping, and frames	1	Roughly 6' x 6'8"	1995	Rehab / Repair As Needed	Excellent	70	2	1.8	1.9	Not Applicable
Other	11 - Other	Secondary structural	Electrical/Control Room Louver (L-2)	Minor Paint Loss, could use a cleaning	1	Roughly 3' x 3'	1995	Rehab / Repair As Needed	Good	40	2.4	1.6	2.0	Not Applicable
Other	11 - Other	Primary structural	Generator Building CMU Exterior Walls	Some chips and loss sectiond, wall is painted so can't see if any discoloration or leaks		Perimeter of shed	1995	Rehab / Repair As Needed	Good	60	2.2	1.8	2.0	Not Applicable
Other	11 - Other	Load bearing	Exterior Concrete Pad	Typical wear and tear, discoloration, chips on corners, hairline cracking		Roughly 6'x'6'	1995	Rehab / Repair As Needed	Good	70	2	1.8	1.9	Not Applicable

**APPENDIX D –  
VERTICAL ASSET RECOMMENDATIONS**

**Project Category:**

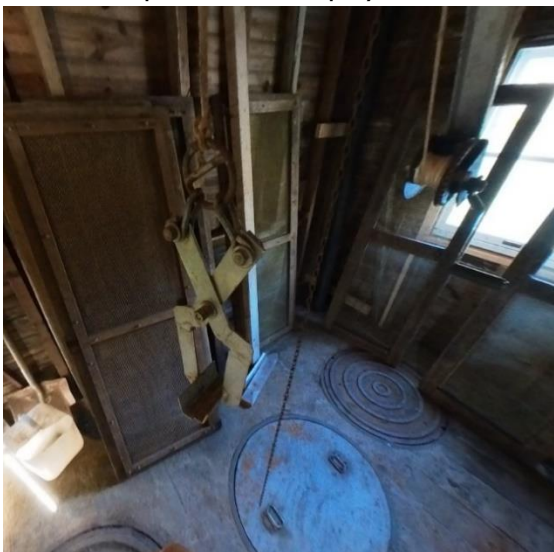
Water Treatment Plant

**Project Title:**

Austin Brook Reservoir & Gate House Upgrade Project

**Project Description**

The Austin Brook Reservoir is located at the end of Reservoir Drive, adjacent to the Chester water treatment facility. Until recently, Austin Brook Reservoir had been the primary source of water for the Town. Issues with iron and manganese have caused concerns with the use of the reservoir. Historically, sedimentation in the reservoir has been an ongoing concern and requires regular maintenance. Sediment removal maintenance was performed in 2024 and needs to be performed on a more frequent/consistent basis. The existing screens for the screen house were intended to remove larger debris; however, finer debris and sediment has passed through these screens and creates issues with the filter media. Our recommendations for the screens would be to replace the existing screens with ones capable of filtering finer debris while minimizing operation and maintenance by staff. The gate house is equipped with a hoist system with no load rating and appears to be undersized for handling any heavy equipment. It is recommended that the screens and hoist system be upgraded. Additionally, as part of the screen house upgrades it is recommended that the access path to the screen house be upgraded with an aluminum or galvanized steel access walkway and stairs with railings and toe plates. Additionally, the existing dam is showing signs of structural damage, it is recommended that a full evaluation of the dam be conducted to determine the scope of improvements. As part of the dam improvements, it is recommended that the Town put aside funds for rehabilitation. Lastly, we identified that feeding a pre-oxidant, as originally recommended by Dr. Gullick, could potentially aid in reducing total organic carbon to the system which would help reduce disinfection by-products that the Town struggles with. We recommend that a study be conducted to determine if a pre-oxidant would be beneficial and that funds be put aside to pay for the installation of a pre-oxidant system if beneficial.



**Project Category:**

Water Treatment Plant

**Project Title:**

Austin Brook Reservoir & Gate House Upgrade Project

**Engineer’s Opinion of Probable Cost as of 2025**

<b>Description</b>	<b>Units</b>	<b>Qty</b>	<b>Unit Price</b>	<b>Total<sup>1</sup></b>
Screen Component Upgrade	L.S.	1	\$30,000	\$48,000
Reservoir Maintenance	L.S.	1	\$15,000	\$24,000
Hoist Replacement	L.S.	1	\$15,000	\$24,000
Access Improvements	L.S.	1	\$30,000	\$48,000
<b>Construction Subtotal</b>				<b>\$144,000</b>
<b>Evaluations and Studies</b>				
Phase I Dam Inspection				\$10,000
<b>Total Planning Level Project Cost</b>				<b>\$154,000</b>

1. Total Project Costs for Construction Projects include 30% contingency and 30% engineering

**Project Category:**

Water Treatment Plant

**Project Title:**

Horn Pond & Intake Upgrade Project

**Project Description**

Horn Pond is the secondary water source for the Town of Chester and flows by gravity to the water treatment facility. Horn Pond is located entirely in the Town of Becket and is currently only available by boat via private property. The existing access road to the site is no longer accessible due to storm damage. Horn Pond’s PVC intake pipe was recently anchored to the bottom of the pond by the Town’s Water Commission. Historically this intake line has been prone to air binding which is referenced in previous engineering reports. The intake pipe sends water through two screens before traveling several miles to the treatment plant. It is recommended that a full inspection of the intake line be conducted to evaluate its condition. It is recommended that the Town set aside funds to repair/replace the inlet line and inlet manifold as needed in order to maintain Horn Pond as an operational source. Recent site visits and investigations by the Town have shown that there has been an increase in the growth of aquatic vegetation within the pond, which has reduced accessibility to the pond and could be impacting overall raw water quality. Due to limited landownership rights, frontage, and lack of passable access road, only limited maintenance activities on screens and valves can be conducted by Town staff. It is recommended that the Town rebuild and improve the access road or establish a more permanent right-of-way entry to the pond. The intake is in the middle of the pond and requires a boat and diver to access, making it difficult for operators to perform maintenance. The existing screens and gate valves for the intake are also in a location that requires boat access. The existing screens appear to be undersized and lack regular maintenance due to this limited access. It is recommended that a new screen system be installed. We identified that feeding a pre-oxidant could potentially aid in reducing total organic carbon to the system which would help reduce disinfection by products that the Town struggles with. We recommend that a study be conducted to determine if a pre-oxidant would be beneficial and set funds aside to implement the findings of this study.



**Project Category:**

Water Treatment Plant

**Project Title:**

Horn Pond & Intake Upgrade Project

**Engineer’s Opinion of Probable Cost as of 2025**

<b>Description</b>	<b>Units</b>	<b>Qty</b>	<b>Unit Price</b>	<b>Total<sup>1</sup></b>
Screen Upgrades	L.S.	1	\$50,000	\$80,000
Inspection of Inlet Pipe & Report	L.S.	1	\$15,000	\$24,000
Repairs/Replacement of Inlet Line	ALLOW	1	\$50,000	\$80,000
Lands/Property Purchase around Pond	ALLOW	1	\$50,000	\$80,000
<b>Construction Subtotal</b>				<b>\$264,000</b>
<b>Evaluations and Studies</b>				
Horn Pond Maintenance/Access Evaluation				\$40,000
Pre-Oxidant Study for Austin Brook and Horn Pond				\$40,000
<b>Total Planning Level Project Cost</b>				<b>\$344,000</b>

1. Total Project Costs for Construction Projects include 30% contingency and 30% engineering

**Project Category:**

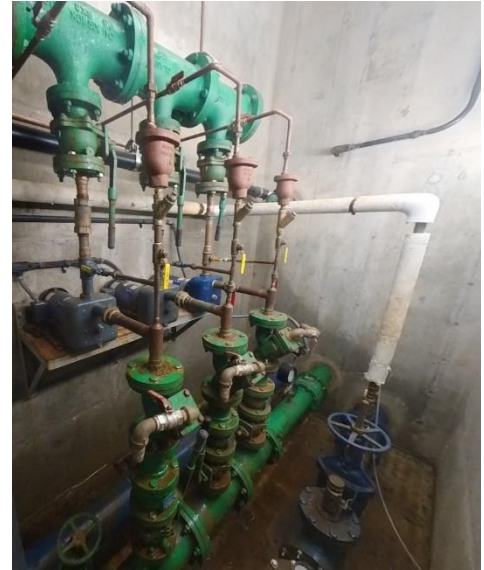
Water Treatment Plant

**Project Title:**

Raw Water Pumps Upgrades

**Project Description**

The raw water enters the water treatment plant through the plant’s basement. When Horn Pond is utilized as a raw water source, water flows directly from the pond to the top of the filters. When Austin Brook is used, the raw water must be pumped up, using self-priming pumps, through a 1” water line to the 6” pump headers to allow water to be lifted to the filter beds. Currently the raw water pumping system has several issues, the existing 6” raw water check valve has been identified as a potential failure point for the system and it is recommended that this check valve be replaced in-kind. The existing raw water pumps appear to be different from the originally specified pumps and as such are inadequate at moving water on top of the filters. It is recommended that an engineering study be conducted to identify a new pumping solution. As part of the pumping evaluation, it is recommended that the Town put aside funds to upgrade the existing pumping system.



**Engineer’s Opinion of Probable Cost as of 2025**

<b>Description</b>	<b>Units</b>	<b>Qty</b>	<b>Unit Price</b>	<b>Total<sup>1</sup></b>
Replacement of Raw Water Check Valve	EA.	1	\$15,000	\$24,000
Replacement of Raw Water Pre-Filter	EA.	1	\$15,000	\$24,000
<b>Construction Subtotal</b>				<b>\$48,000</b>
<b>Evaluations and Studies</b>				
Austin Brook Engineering Pumping Report				\$25,000
<b>Total Planning Level Project Cost</b>				<b>\$73,000</b>

1. Total Project Costs for Construction Projects include 30% contingency and 30% engineering

**Project Category:**

Water Treatment Plant

**Project Title:**

Water Treatment Plant

**Project Description**

The main floor of the treatment plant contains most of the plant’s piping, valves, inline data collection hardware, laboratory equipment, and chemical feed equipment. During our site visit several assets were found to be corroded and in need of rehabilitation. The existing pipe supports, and pipe valves need rehabilitation. It is recommended that the pipe supports be replaced in kind and that the valves be surface prepared and repainted to protect them from additional corrosion. Additionally, it was found that the existing backflow preventer for chemical addition needs replacement and should be replaced in-kind. Lastly, in addition to the pre-oxidant studies that are proposed for the two raw water sources, it is recommended that an additional study be conducted to evaluate the growth of disinfection-by-products in the finished water while utilizing different source waters.



**Engineer’s Opinion of Probable Cost as of 2025**

<b>Description</b>	<b>Units</b>	<b>Qty</b>	<b>Unit Price</b>	<b>Total<sup>1</sup></b>
Surface Prep and Painting of Valves	ALLOW	1	\$10,000	\$16,000
Replacement of Pipe Supports	ALLOW	1	\$15,000	\$24,000
Replacement of Back Flow Preventer	EA	1	\$4,375	\$7,000
<b>Construction Subtotal</b>				<b>\$47,000</b>
<b>Studies</b>				
Disinfection By Product Study				\$30,000
<b>Total Planning Level Project Cost</b>				<b>\$77,000</b>

1. Total Project Costs for Construction Projects include 30% contingency and 30% engineering

**Project Category:**

Water Treatment Plant

**Project Title:**

Filter/Clearwell Improvements Project

**Project Description**

The water treatment plant has three filters that are located on the roof of the treatment plant and provide most of the treatment for the Town’s drinking water. The clearwell is the Town’s water storage facility below the filters. The Town recently removed and replaced the filter media in all three filters. During our site visit, structural concerns were identified for the filter and clearwell exterior walls and the six filter hatches. It is recommended that these structural concerns be addressed to ensure that the assets do not fail. Lastly, it is recommended that the filter roof be provided with additional site lights to provide additional security to the site and for maintenance purposes during the night hours.



**Engineer’s Opinion of Probable Cost as of 2025**

<b>Description</b>	<b>Units</b>	<b>Qty</b>	<b>Unit Price</b>	<b>Total<sup>1</sup></b>
Structural Rehabilitation	ALLOW	1	\$62,500	\$100,000
Site Lighting Upgrade	L.S.	1	\$15,000	\$24,000
<b>Construction Subtotal</b>				<b>\$124,000</b>
<b>Studies</b>				
Structural Inspection of filters and clearwell				\$20,000
<b>Total Planning Level Project Cost</b>				<b>\$144,000</b>

1. Total Project Costs for Construction Projects include 30% contingency and 30% engineering

**Project Category:**

Water Treatment Plant

**Project Title:**

Former Chlorination Building Improvement Project

**Project Description**

The Former Chlorination building is located near the bottom of the access drive to the water treatment plant. During our site visit we identified that the building has several breaches in it that have allowed small animals and insects to enter the building. It is recommended that holes around the building be sealed, and the ventilation pipes be screened to avoid potential contamination.



**Engineer’s Opinion of Probable Cost as of 2025**

<b>Description</b>	<b>Units</b>	<b>Qty</b>	<b>Unit Price</b>	<b>Total<sup>1</sup></b>
Former Chlorination Building Sealing Improvements	L.S.	1	\$10,000	\$16,000
<b>Construction Subtotal</b>				
<b>Total Planning Level Project Cost</b>				<b>\$16,000</b>

1. Total Project Costs for Construction Projects include 30% contingency and 30% engineering

**Project Category:**

Water Enterprise

**Project Title:**

Enterprise Improvements Project

**Project Description**

It is recommended that the GIS system be maintained and updated each year to ensure that the Town can build on the established system. On call services will include support for existing GIS system developed as part of the asset management plan.

**Engineer’s Opinion of Probable Cost as of 2025**

<b>Description</b>	<b>Units</b>	<b>Qty</b>	<b>Unit Price</b>	<b>Total</b>
On-Call GIS Water Department	Annual	1	\$4,000	\$4,000
GIS Yearly Subscription	Annual	1	\$1,000	\$1,000
<b>Total Planning Level Project Cost</b>				<b>\$5,000</b>

**APPENDIX E –  
GIS INSPECTION FORMS**

# Chester Water Process Facility Inspection



## General Information

Inspection Date

Time

Asset \*

Asset Type \*

- Piping and Valve
- Pumping System
- Treatment
- Civil/Site Safety and Security
- Other

Facility \*

- Chester Water Treatment Plant
- Other

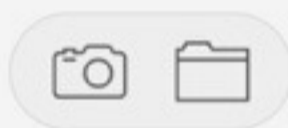
## Current State of Equipment

Overall Physical Condition \*



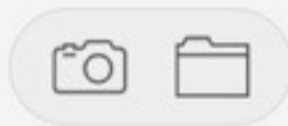
Condition Photo(s) \*

Please include the Asset Nameplate.



Nameplate Photo(s) \*

Please include the Asset Nameplate.



Is there corrosion or rust present? \*

- Yes
- No

Are there structural concerns with housekeeping pads and/or concrete floors? \*

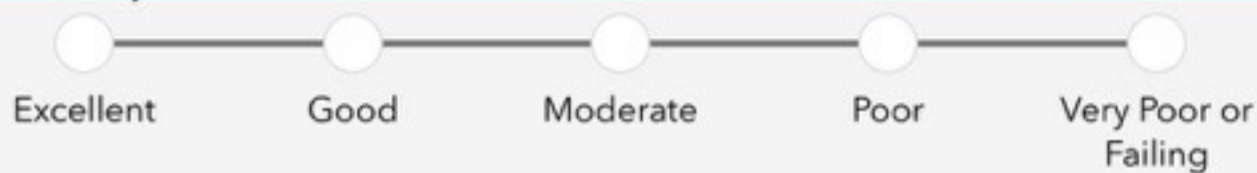
- Yes
- No

Are there unusual noises or vibrations? \*

- Yes
- No



## Chester Water Process Facility Inspection



## Condition Photo(s) \*

Please include the Asset Nameplate.



## Nameplate Photo(s) \*

Please include the Asset Nameplate.



## Is there corrosion or rust present? \*

 Yes No

## Are there structural concerns with housekeeping pads and/or concrete floors? \*

 Yes No

## Are there unusual noises or vibrations? \*

 Yes No

## ▼ Consequence of Failure

## Redundancy

 Full redundancy and workarounds Workarounds available, some redundancy No redundancy or workarounds Asset Missing Does not apply

## Equipment Notes

Please include any operator concerns regarding maintenance, operation, downtime, inefficiencies, or other observations



**APPENDIX F –  
GIS BASED DIGITAL FIELD FORMS**



# Water Treatment Plant Daily Log



## General Info

Date

Month

Water System Name

Chester

PWS ID

1059000

## Daily Main Screen Readings

C1	C2	pH
<input type="text"/>	<input type="text"/>	<input type="text"/>
Temperature	Turbidity	Flow
<input type="text"/>	<input type="text"/>	<input type="text"/>
CW/L	CL2	Hydroxide
<input type="text"/>	<input type="text"/>	<input type="text"/>
RW/GPM	RW/NTU	Gen hrs
<input type="text"/>	<input type="text"/>	<input type="text"/>
FW/Totalizer	FW/Total	
<input type="text"/>	<input type="text"/>	

## Chemical Treatment Report

Treatment Facility

Chemical 1 Name

Chemical 2 Name

Volume of Treated Water (gal)	Chemical 1 Volume (gal)	Chemical 1 Dosage (mg/l)
<input type="text"/>	<input type="text"/>	<input type="text"/>
Chemical 2 Volume (gal)	Chemical 2 Dosage (mg/l)	Grab Sample pH
<input type="text"/>	<input type="text"/>	<input type="text"/>



## Water Treatment Plant Daily Log



Water System Name

Chester

PWS ID

1059000

▼ Daily Main Screen Readings

C1

C2

pH

Temperature

Turbidity

Flow

CW/L

CL2

Hydroxide

RW/GPM

RW/NTU

Gen hrs

FW/Totalizer

FW/Total

▼ Chemical Treatment Report

Treatment Facility

Austin Brook



Chemical 1 Name

Chemical 2 Name

Volume of Treated Water (gal)

Chemical 1 Volume (gal)

Chemical 1 Dosage (mg/l)

Chemical 2 Volume (gal)

Chemical 2 Dosage (mg/l)

Grab Sample pH

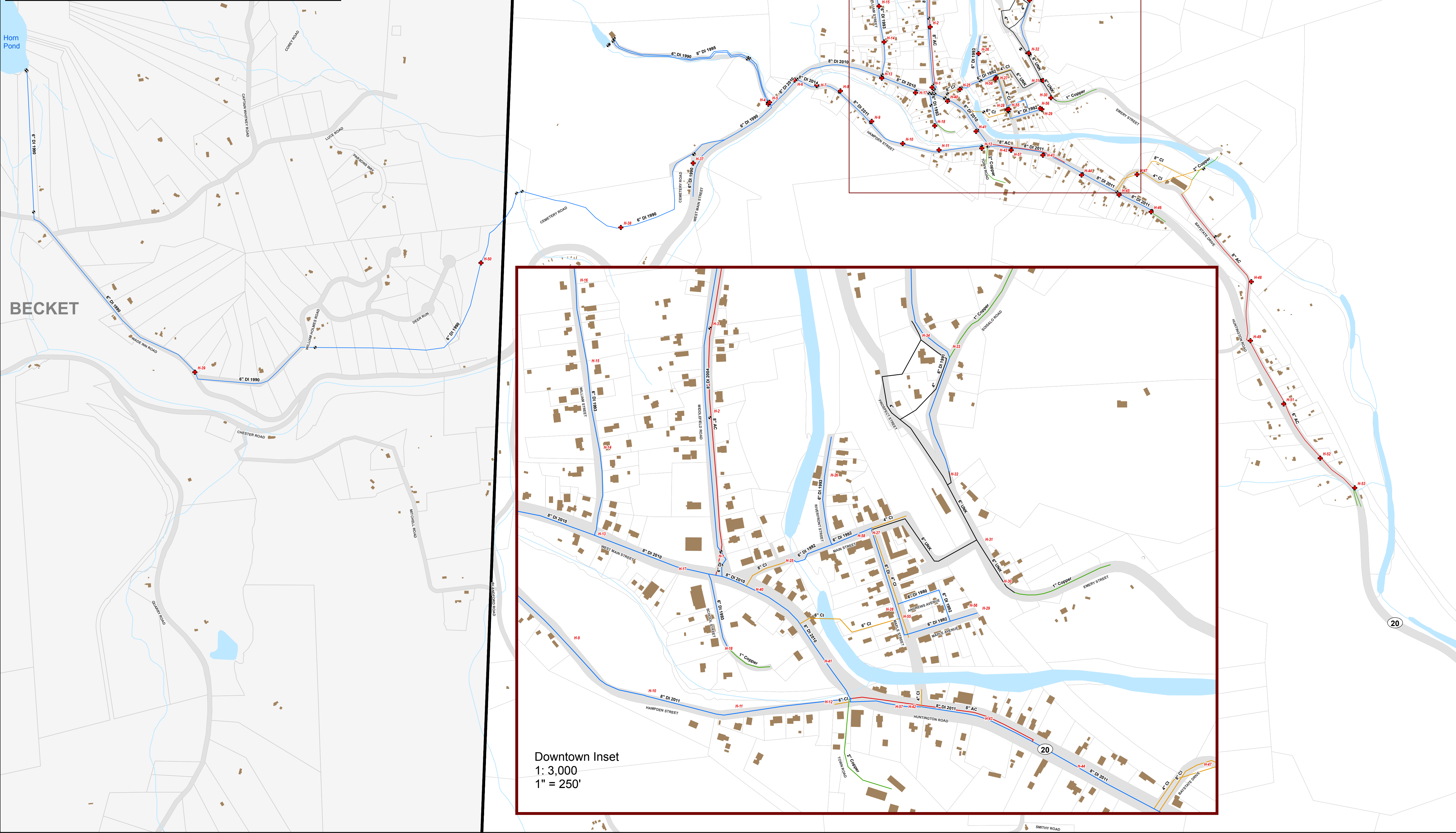
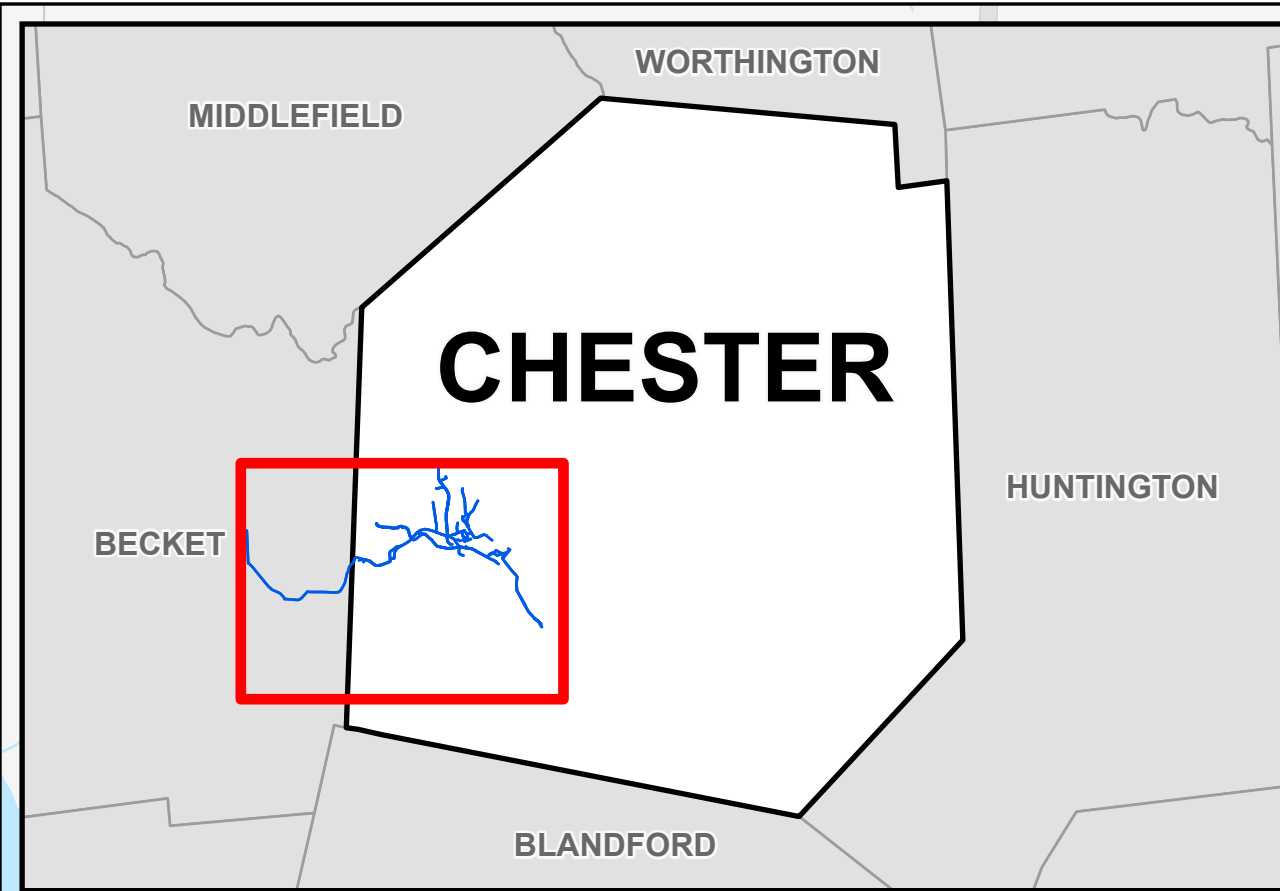
CL2 Residual

C Add Average pH

C Add Average CL2



**APPENDIX G –  
WATER SYSTEM OVERVIEW MAP**

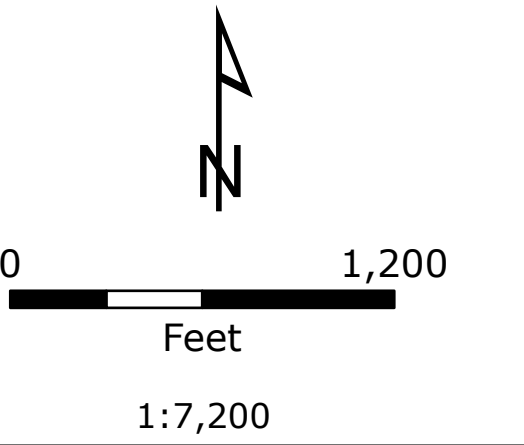
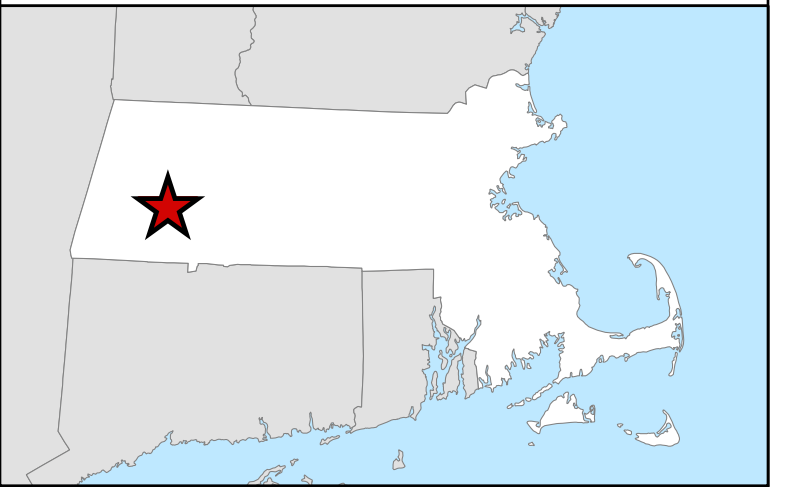


# APPENDIX G SYSTEM OVERVIEW MAP

## LEGEND

- Hydrant
- Gate Valve
- Water Main Material
- AC Main
- CI Main
- Copper Main
- DI Main
- Unknown Material
- Chester Town Boundary
- Other Town Boundary
- Building Footprint
- Parcel Boundary
- Roadway
- Water Body

## LOCUS MAP



## NOTES

Data source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology. Data valid as of June 2025.  
Approx. parcel data (FY23) courtesy of MassGIS.  
Water plans courtesy of Chester Water Dept.

**Chester Water Department  
Chester, Massachusetts**

June 2025

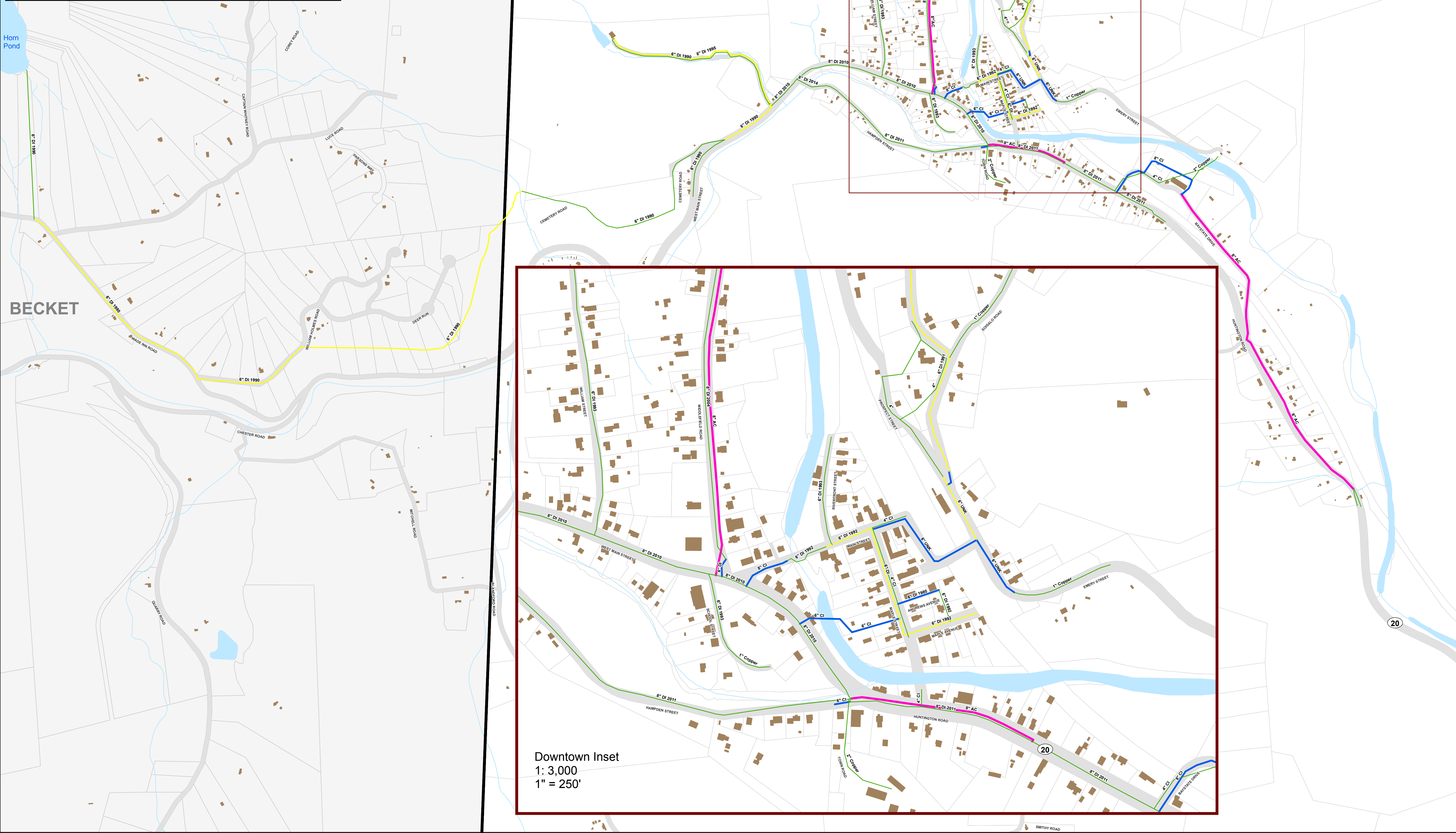
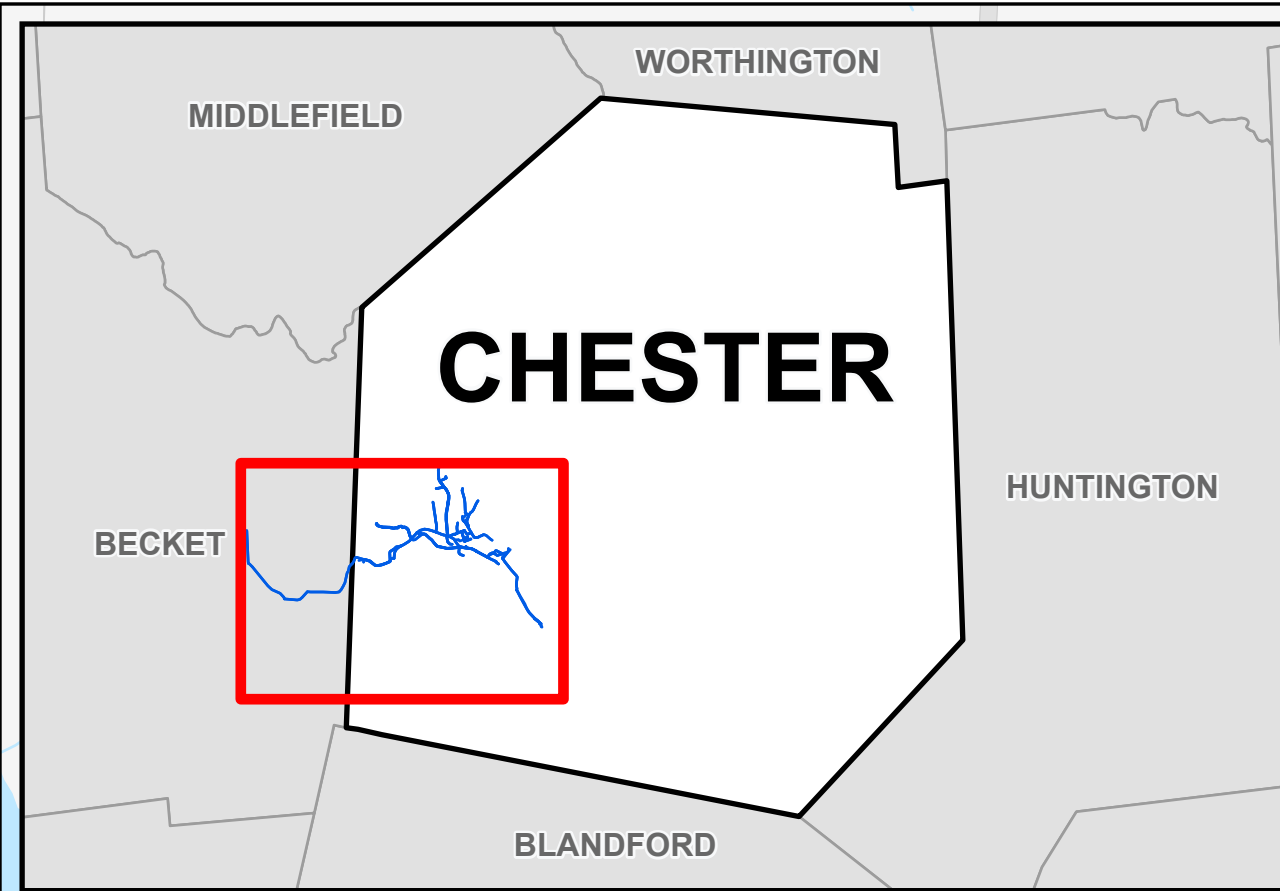


**APPENDIX H –  
WATER SYSTEM AGE MAP**



**Tighe&Bond**

**APPENDIX I –  
WATER SYSTEM RISK MAP**

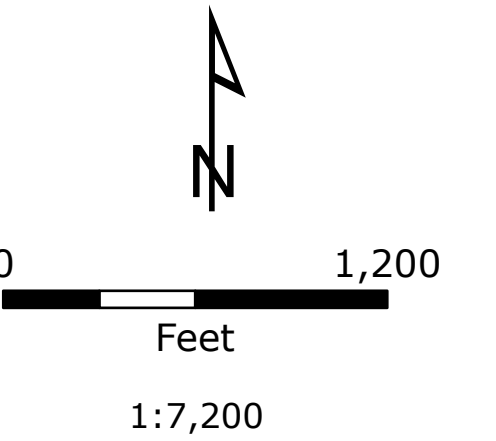
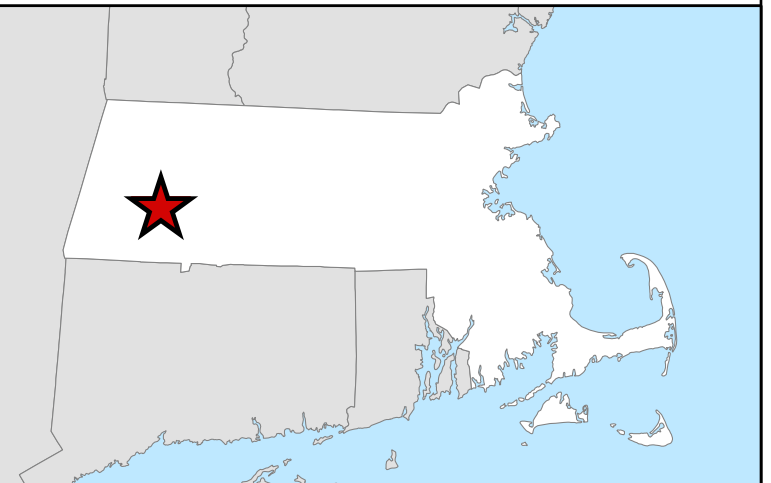


**APPENDIX I  
OVERALL  
RISK SCORES**

**LEGEND**

- Risk
- Immediate
  - High
  - Medium
  - Low
  - Chester Town Boundary
  - Other Town Boundary
  - Building Footprint
  - Parcel Boundary
  - Roadway
  - Water Body

**LOCUS MAP**

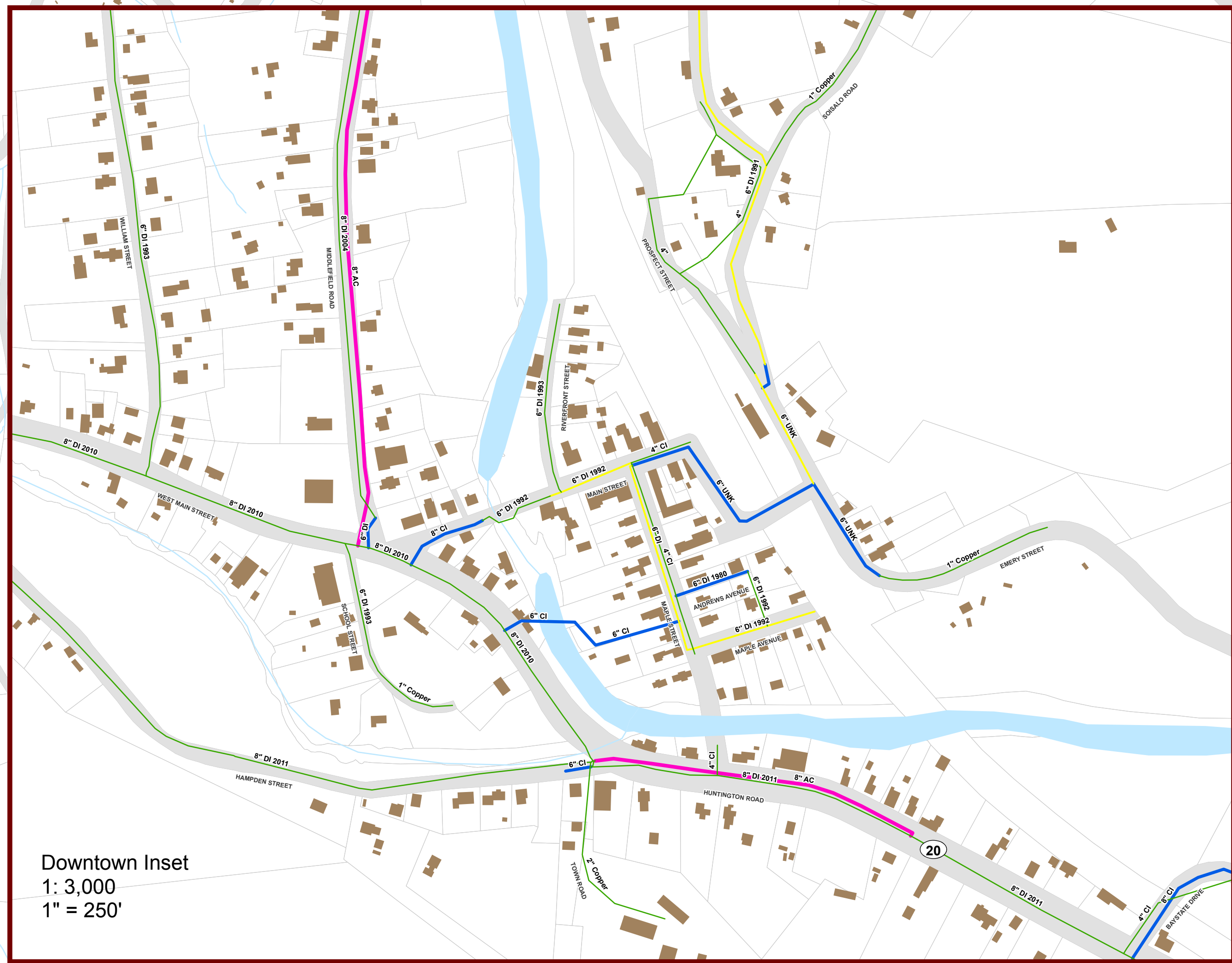


**NOTES**

Data source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology. Data valid as of July 2025.  
Approx. parcel data (FY23) courtesy of MassGIS.  
Water plans courtesy of Chester Water Dept.

**Chester Water Department  
Chester, Massachusetts**

July 2025

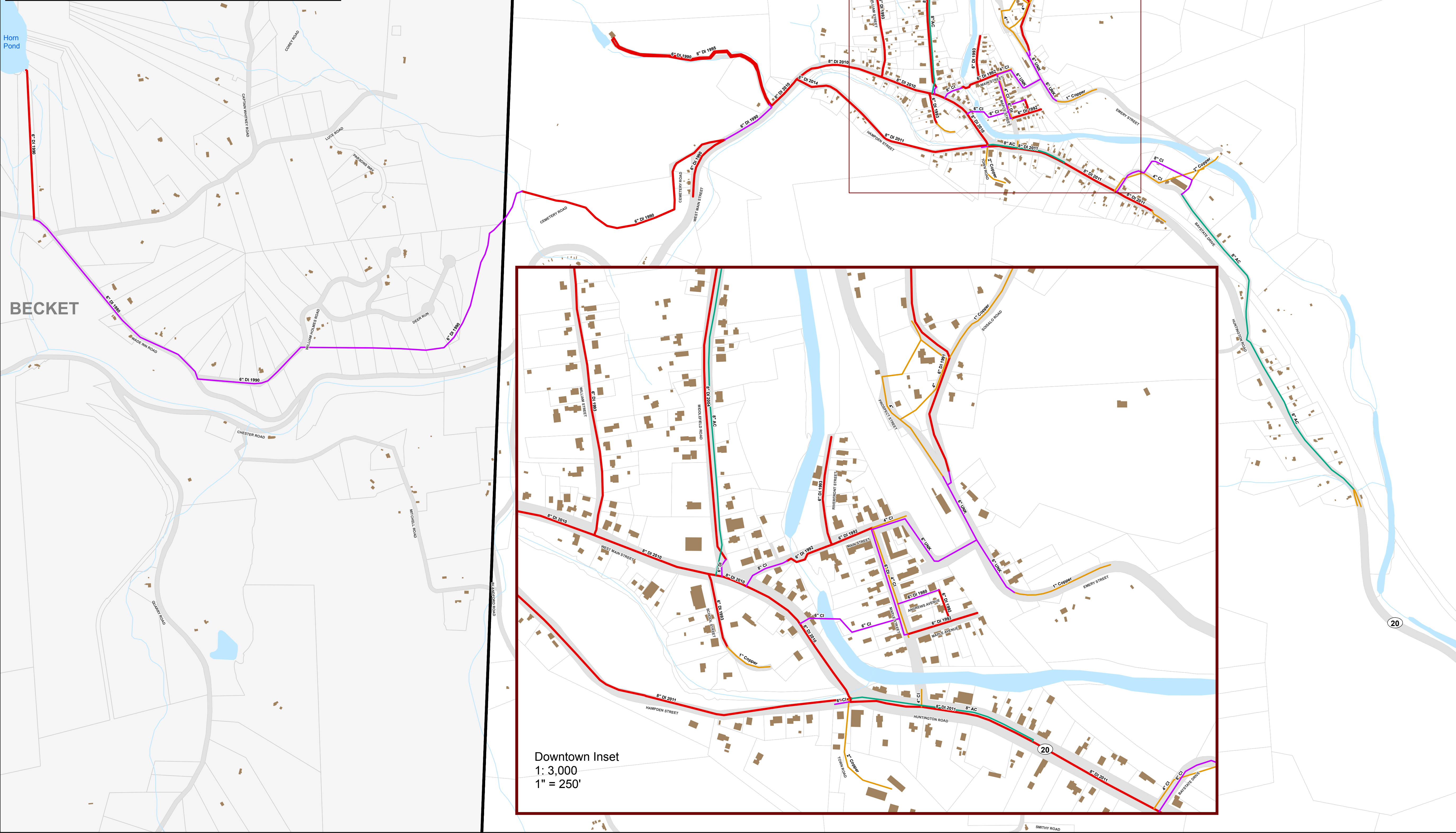
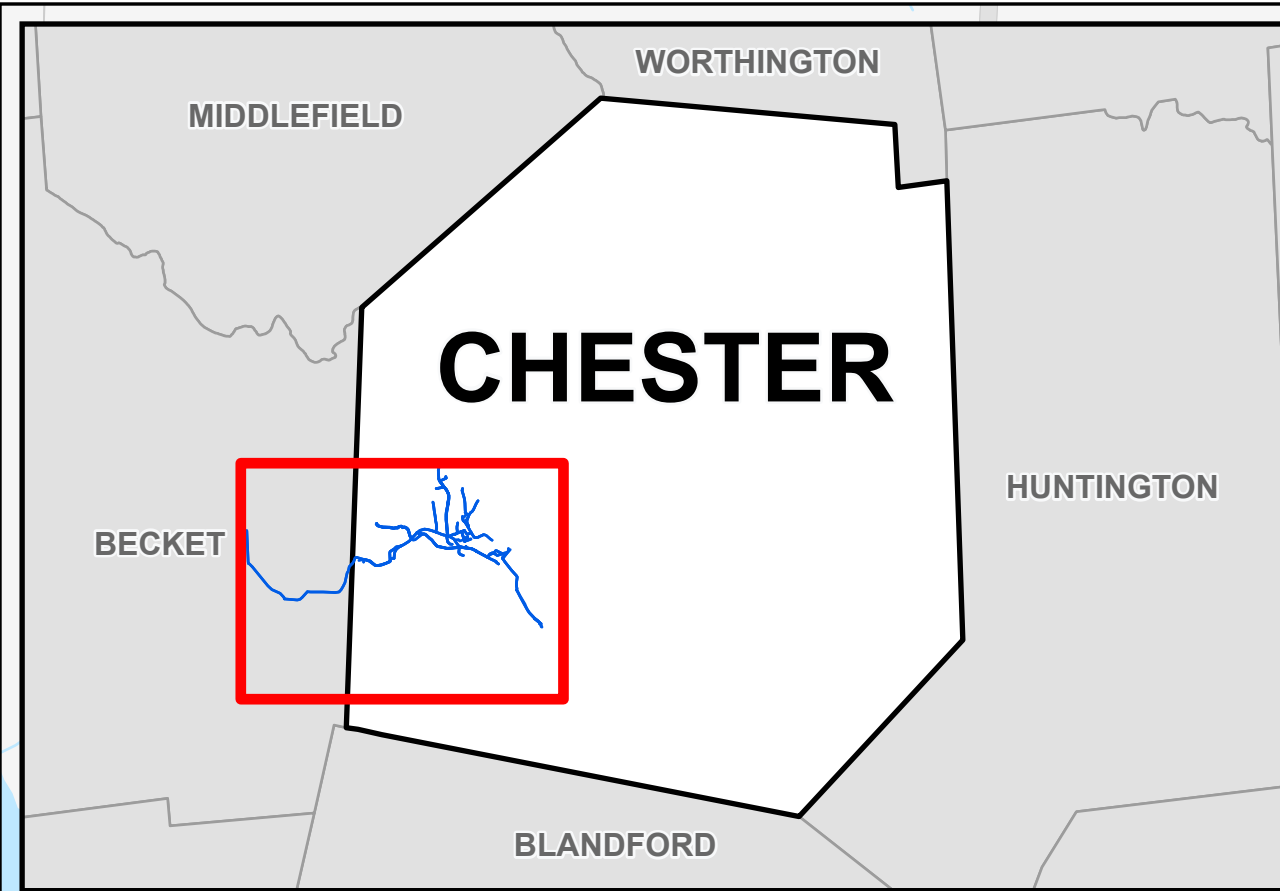


Downtown Inset  
1: 3,000  
1" = 250'

**APPENDIX J –  
WATER SYSTEM REGIONS**



**APPENDIX K –  
WATER SYSTEM MAP BY STRATEGY**



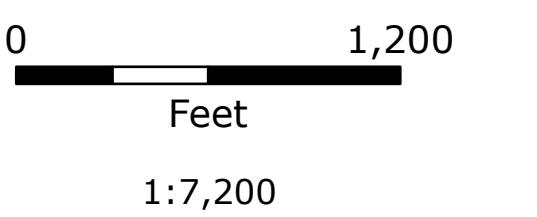
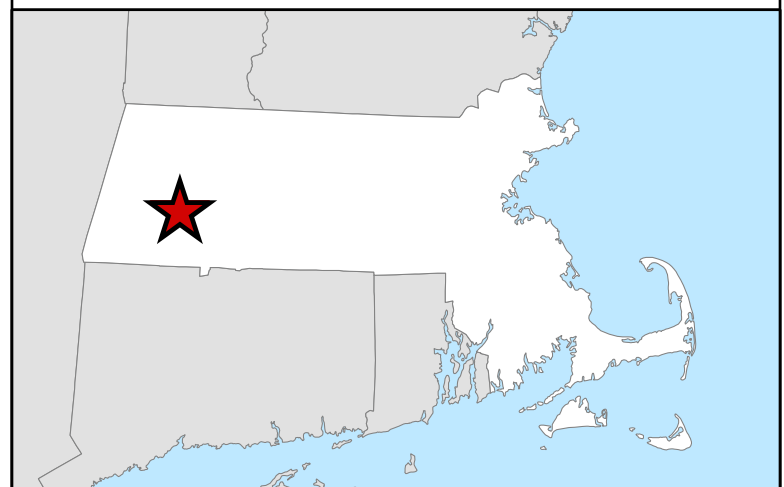
# APPENDIX K SYSTEM STRATEGY MAP

## LEGEND

### Strategy

- Priority Maintenance
- Opportunistic Investigation
- Critical Investigation
- Priority Investigation
- Chester Town Boundary
- Other Town Boundary
- Building Footprint
- Parcel Boundary
- Roadway
- Water Body

## LOCUS MAP



## NOTES

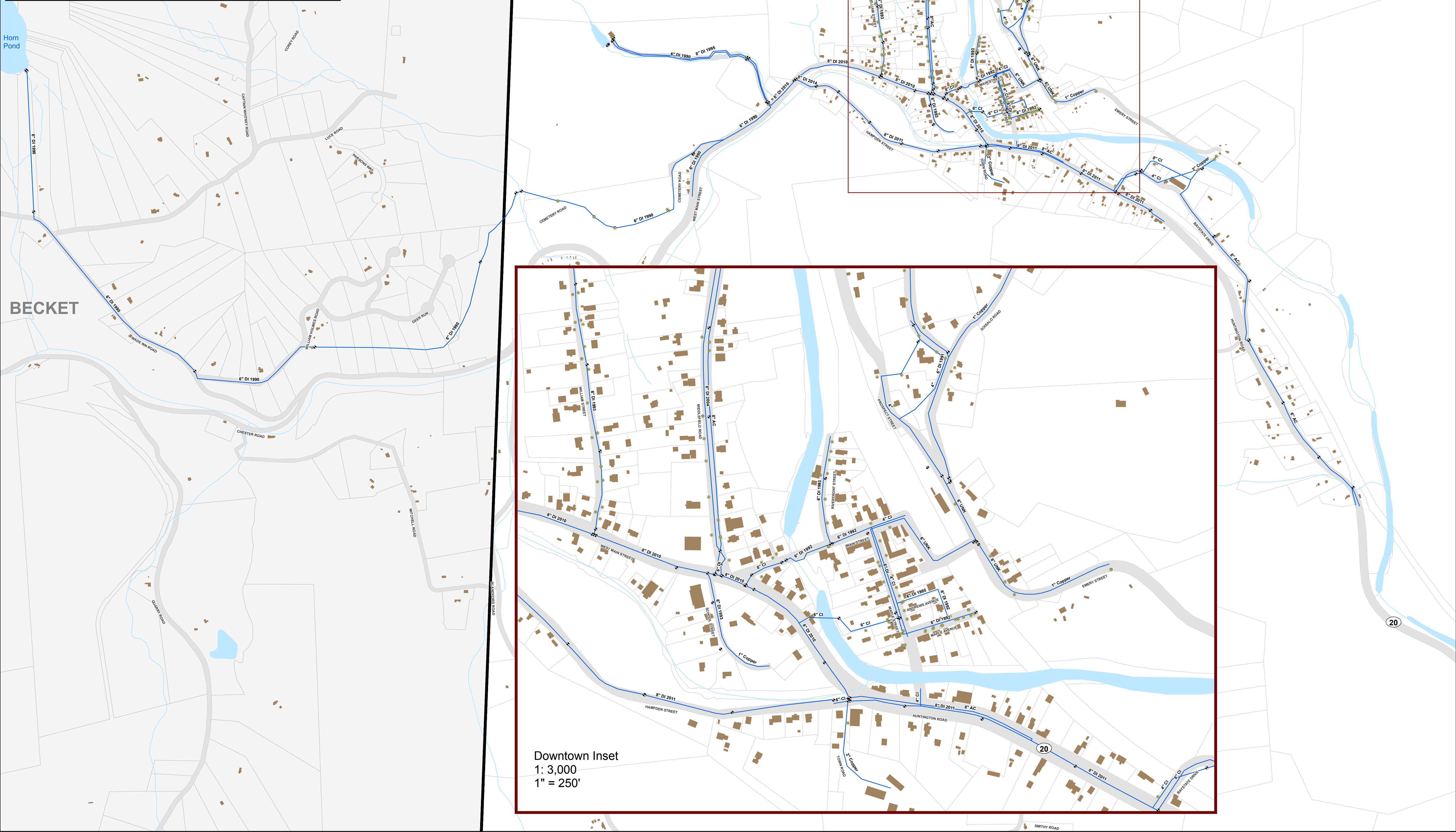
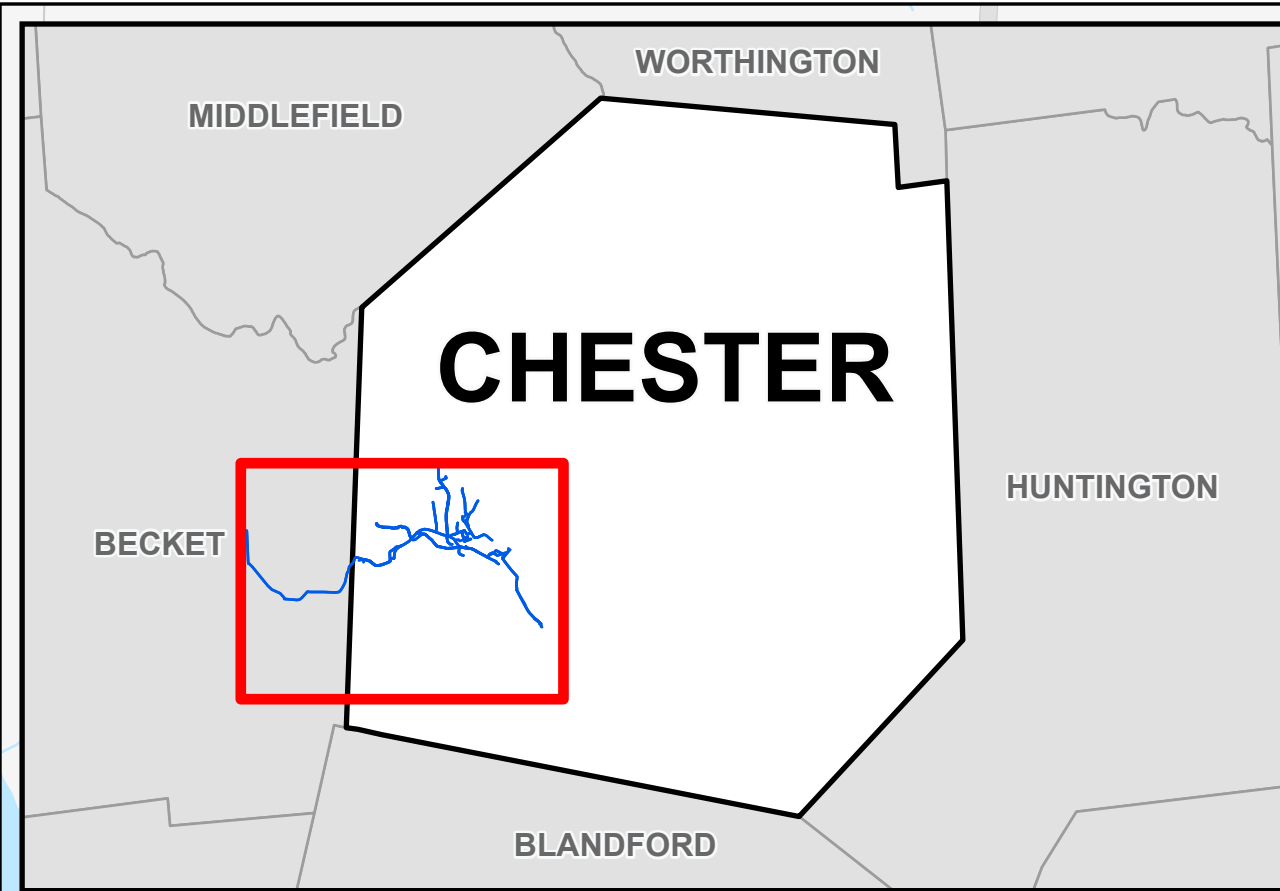
Data source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology. Data valid as of July 2025.  
Approx. parcel data (FY23) courtesy of MassGIS.  
Water plans courtesy of Chester Water Dept.

**Chester Water Department  
Chester, Massachusetts**

July 2025

**Tighe & Bond**

**APPENDIX L –  
GATE VALVES AND CURB STOPS MAP**

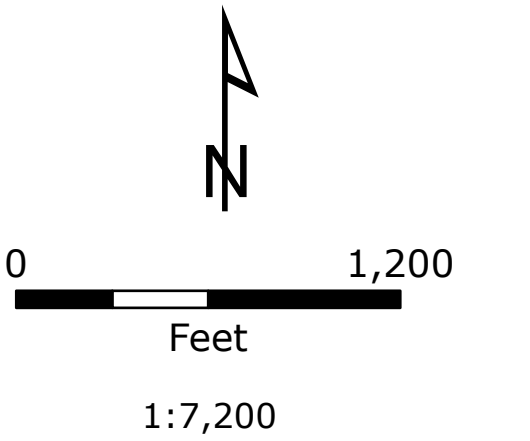
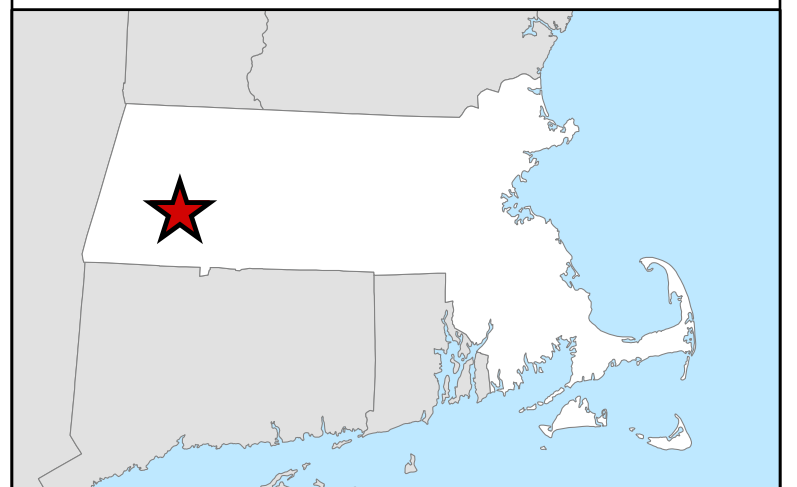


## APPENDIX L GATE VALVES AND CURB STOPS MAP

### LEGEND

- Gate Valve
- Curb Stop
- Water Main
- Chester Town Boundary
- Other Town Boundary
- Building Footprint
- Parcel Boundary
- Roadway
- Water Body

### LOCUS MAP



### NOTES

Data source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology. Data valid as of June 2025.  
Approx. parcel data (FY23) courtesy of MassGIS.  
Water plans courtesy of Chester Water Dept.

**Chester Water Department**  
**Chester, Massachusetts**

June 2025

**Tighe & Bond**

**APPENDIX M –  
HYDRANT INVENTORY**

CWD Label	CWD Comments	Latitude	Longitude	Hydrant ID	Location
Middlefield M&H 2003 H15	N/A	42.27958612	-72.982666	H-1	Middlefield Road
Middlefield M&H H16	N/A	42.28154509	-72.98279532	H-2	Middlefield Road
Middlefield M&H 2004 H17	N/A	42.2827215	-72.9828368	H-3	Middlefield Road
RR Mueller 1996 H52 RAW	N/A	42.27895369	-72.98980144	H-4	Reservoir Drive @ Route 20
RR H 1	22 oct. flushed 2min	42.27901471	-72.98975064	H-5	Reservoir Drive @ Route 20
Muller 2008, r20 R20	N/A	42.27974822	-72.98867317	H-6	Hampden Street @ Route 20
Muller 2006 Hampden H3	Oct 22 flushed 3 min	42.27960127	-72.98769815	H-7	Hampden Street
Kennedy 2018 H4	Oct. 22 flushed 2 min	42.27942266	-72.986661	H-8	Hampden Street
Kennedy 2018 H5	Oct. 22 flushed 2 min	42.27844873	-72.98526813	H-9	Hampden Street
Kennedy 2018 H5	Oct. 22 flushed 5 min	42.27775289	-72.98389858	H-10	Hampden Street
Hampden 2018 Kennedy H7	Oct. 22 Flushed 1 minute	42.27756459	-72.98231332	H-11	Hampden Street
Hampden Mueller 2010 H8	N/A	42.2776458	-72.98045026	H-12	Hampden Street
Mueller 2007 R20 H9	Oct. 24	42.27985956	-72.98486342	H-13	William Street @ Route 20
Muller 1988 William H10	N/A	42.28102908	-72.98478945	H-14	William St
Albert 1988 H11 William	N/A	42.28219332	-72.98503648	H-15	William St
M&H 2004 H12 William	N/A	42.28328286	-72.98527153	H-16	William St
Mueller 2007 R20 H13	N/A	42.27940708	-72.98338575	H-17	Route 20
Mueller 1988 School H14	N/A	42.2783416	-72.98252116	H-18	School Street
Middlefield Mueller 2004 H18	N/A	42.28460404	-72.98258195	H-19	Middlefield Road
Middlefield M&H 2003 H19	N/A	42.28554323	-72.9824984	H-20	Middlefield Road
Middlefield Smith 1978 H20	N/A	42.28586621	-72.98285522	H-21	Middlefield Road
Olin Mueller 1988 H21	N/A	42.28630066	-72.98435733	H-22	Olin Avenue
Middlefield American Darling 2022 H22	N/A	42.287079	-72.98412626	H-23	Middlefield Road
Middlefield Mueller 1988 H23	N/A	42.28761784	-72.98448867	H-24	Middlefield Road
Main Eddie 1970 H24	Leaky bottom	42.27954296	-72.9814423	H-25	Main Street
Riverfront American Dream 2007 H25	N/A	42.28070782	-72.98065649	H-26	Riverfront Street
Maple Mueller 2014 H26	N/A	42.27993651	-72.97987665	H-27	Main Street
Maple Smith 1973 H27	N/A	42.2789104	-72.9793688	H-28	Main Street
Maple A Mueller 1988 H28	N/A	42.27894422	-72.97785339	H-29	Maple Avenue
Emery Mueller 1988 H29	N/A	42.27931423	-72.97746978	H-30	Emery Street
Prospect-Emery Mueller 2019 H30	N/A	42.27987352	-72.97782176	H-31	Emery Street
U-prospect Mueller 2023 H31	N/A	42.2807498	-72.9784715	H-32	Prospect Street
U-prospect Chapman 1960 H32	N/A	42.2824716	-72.97847506	H-33	Prospect Street
U-prospect Chapman 1893 H33	4"	42.28261588	-72.97903262	H-34	Prospect Street
M-prospect Smith 1976 H34	N/A	42.28459746	-72.97926341	H-35	Prospect Street
Cooper Mueller 1988 H35	N/A	42.2861898	-72.97984347	H-36	Prospect Street
Cemetery American Darling 2015 H51	N/A	42.27700238	-72.99303729	H-37	Cemetery Road @ Route 20
Cemetery The Corey. N/A H50	N/A	42.27487351	-72.99613657	H-38	Cemetery Road
Wade American Darling 1969 H49	N/A	42.26993803	-73.01461529	H-39	Horn Pond Line
R20 Mueller 2010 H36	N/A	42.27914736	-72.98197985	H-40	Route 20
R20 Mueller 2010 H37	N/A	42.2781935	-72.98070863	H-41	Route 20
R20 Mueller 2011 H38	N/A	42.27760043	-72.97916828	H-42	Route 20
R20 Mueller 2011 H39	N/A	42.27745582	-72.97777096	H-43	Route 20
R20 Mueller 2011 H40	N/A	42.2768351	-72.97607303	H-44	Route 20
R20 Mueller 2011 H41	N/A	42.27621123	-72.97441806	H-45	Route 20
R20 Mueller 2011 H42	N/A	42.27567994	-72.97300937	H-46	Route 20
Baystete Mueller 2011 H43	N/A	42.27687499	-72.97365395	H-47	Bay State Drive
Baystate Smith 1976 H44	N/A	42.27347557	-72.96858523	H-48	Bay State Drive
RoundHill American Darling 2020 H45	N/A	42.27155543	-72.96857364	H-49	Route 20
Deer trail Smith 1973 H53	N/A	42.27364058	-73.00221388	H-50	Horn Pond Line
R20 American Darling 2020 H46	N/A	42.26952775	-72.96708165	H-51	Route 20
R20 American Darling 2016 H47	N/A	42.26779407	-72.96544644	H-52	Route 20
R20 Mueller 2005 H48	N/A	42.26684726	-72.96391165	H-53	Route 20
15 Maple St	N/A	42.27893092	-72.97929291	H-55	Main Street
#28 35 Maple Ave	N/A	42.27896709	-72.9779316	H-56	Maple Avenue
#38 253 Rte 20	N/A	42.27760043	-72.97916828	H-57	Route 20
Hydrant #26 1 Maple St	N/A	42.27989939	-72.97990813	H-58	Main Street

**Tighe&Bond**

**APPENDIX N –  
GATE VALVE INVENTORY**

CWD Label	CWD Comments	Latitude	Longitude	GateValveID	Location
Middlefield street	N/A	42.2795186	-72.98255911	G2	Middlefield Road
N/A	Isolation valve Middlefield St	42.27970748	-72.9825761	G3	Middlefield Road
Middlefield 16	N/A	42.28151521	-72.98281913	G4	Middlefield Road
Middlefield H17	N/A	42.28271997	-72.98284765	G5	Middlefield Road
RR 02	N/A	42.28099157	-72.99657659	G6	Reservoir Drive
RR 01	N/A	42.28100088	-72.99657252	G7	Reservoir Drive
RR 03	N/A	42.28091251	-72.99662477	G8	Reservoir Drive
RR 04	N/A	42.28090968	-72.99661595	G9	Reservoir Drive
RR 05	N/A	42.28089929	-72.99660781	G10	Reservoir Drive
RR 06	N/A	42.28079748	-72.99679993	G11	Reservoir Drive
RR 07	Left in photo	42.28079244	-72.99679646	G12	Reservoir Drive
RR 08	N/A	42.28078833	-72.9967935	G13	Reservoir Drive
RR 09	N/A	42.2807623	-72.99683619	G14	Reservoir Drive
RR10	N/A	42.28076129	-72.99683095	G15	Reservoir Drive
RR 12	N/A	42.28045197	-72.99073286	G16	Reservoir Drive
RR 13	N/A	42.28042135	-72.99064438	G17	Reservoir Drive
RR 14	N/A	42.27902929	-72.98984313	G18	Reservoir Drive @ Route 20
RR 15	N/A	42.27900343	-72.98975976	G20	Reservoir Drive @ Route 20
RR H 1	N/A	42.27901332	-72.98975454	G21	Reservoir Drive @ Route 20
RR	Buried in road under blue mark	42.28039668	-72.99074355	G22	Reservoir Drive
N/A	R20 H2	42.27973846	-72.98865345	G23	Hampden Street @ Route 20
R20	N/A	42.2797698	-72.98858827	G24	Hampden Street @ Route 20
R20	N/A	42.27976982	-72.98857029	G25	Hampden Street @ Route 20
R20	N/A	42.27978208	-72.9885686	G26	Hampden Street @ Route 20
Hampden H3	N/A	42.27955608	-72.98768417	G27	Hampden Street
Hampden Main	N/A	42.27955611	-72.98767153	G28	Hampden Street
Hampden 4	N/A	42.27938865	-72.98670422	G29	Hampden Street
Hampden H5	N/A	42.27841409	-72.98531758	G30	Hampden Street
Hampden H6	N/A	42.27774339	-72.9839007	G31	Hampden Street
Hampden Main	N/A	42.27774679	-72.98391449	G32	Hampden Street
Hampden H7	N/A	42.27752924	-72.98230335	G33	Hampden Street
Hampden H8	N/A	42.27771697	-72.98046193	G34	Hampden Street
Hampden-R20 Intersection	N/A	42.27770765	-72.9801649	G35	Town Rd / Hampden St / Route 20
Hampden-R20 Intersection	N/A	42.27770808	-72.98019321	G36	Town Rd / Hampden St / Route 20
Hampden-R20 Intersection	N/A	42.27774377	-72.980191	G37	Town Rd / Hampden St / Route 20
Hampden-R20 Intersection	N/A	42.27775145	-72.98018333	G38	Town Rd / Hampden St / Route 20
Hampden-R20 Intersection	N/A	42.27774718	-72.98016719	G39	Town Rd / Hampden St / Route 20
R20 H9	N/A	42.27988569	-72.98483863	G40	William Street @ Route 20
R20	N/A	42.27989655	-72.98487589	G41	William Street @ Route 20
R20	N/A	42.27990435	-72.98490709	G42	William Street @ Route 20
William+R20	N/A	42.27997148	-72.98484873	G43	William St
William H10	N/A	42.28102839	-72.9847945	G44	William St
William H11	N/A	42.28219282	-72.98505561	G45	William St
William H20	N/A	42.28327761	-72.98529363	G46	William St
R20 H13	N/A	42.27946764	-72.98336478	G47	Route 20
H14 School	N/A	42.27837823	-72.98253429	G48	School Street
School Chester Commons Fire Line	N/A	42.27900515	-72.98269574	G49	School Street
Middlefield H18	Check how open	42.28459151	-72.98249475	G50	Middlefield Road
Middlefield H19	N/A	42.28554562	-72.98252452	G51	Middlefield Road
H20	N/A	42.2858733	-72.98283758	G52	Middlefield Road
H21	Boot pointing	42.28631126	-72.98435858	G53	Olin Avenue
Olin Main	N/A	42.28632761	-72.98438604	G54	Olin Avenue
N/A	N/A	42.28650738	-72.98343604	G55	Middlefield Road
Middlefield H22	N/A	42.28709469	-72.98412383	G56	Middlefield Road
Middlefield	N/A	42.28720957	-72.98416595	G57	Middlefield Road
Middlefield Building Supply	N/A	42.28726445	-72.98411745	G58	Middlefield Road
Middlefield Dead Mill	N/A	42.28726099	-72.98410687	G59	Middlefield Road
Middlefield ?	N/A	42.28725436	-72.9841008	G60	Middlefield Road
Middlefield	N/A	42.28381936	-72.98268209	G61	Middlefield Road
Middlefield	N/A	42.28379659	-72.98262925	G62	Middlefield Road
Middlefield	N/A	42.28380232	-72.98262522	G63	Middlefield Road
Middlefield	N/A	42.28381168	-72.98263252	G64	Middlefield Road

CWD Label	CWD Comments	Latitude	Longitude	GateValveID	Location
Middlefield	N/A	42.2838157	-72.98262651	G65	Middlefield Road
Main H24	N/A	42.27956466	-72.98144918	G66	Main Street
Main Main	N/A	42.27959678	-72.98136818	G67	Main Street
Riverfront H25	N/A	42.28071331	-72.9806787	G68	Riverfront Street
Main Main	N/A	42.27983218	-72.9805358	G69	Main Street
Main Riverfront	N/A	42.2798259	-72.98056178	G70	Main Street
Main H26	N/A	42.27997999	-72.97989424	G71	Main Street
Maple curb supply	N/A	42.27884452	-72.97930741	G72	Main Street
Main	N/A	42.27883927	-72.97928082	G73	Main Street
Maple H27	N/A	42.27891094	-72.97936038	G74	Main Street
Prospect-Emery H30	N/A	42.27985578	-72.97787109	G75	Emery Street
Prospect-Emery	N/A	42.27989099	-72.97790396	G76	Emery Street
Prospect-Emery	N/A	42.27989505	-72.97793344	G77	Emery Street
Prospect-Emery	N/A	42.27988605	-72.97796141	G78	Emery Street
U-Prospect H31	N/A	42.28074918	-72.97843366	G79	Prospect Street
U-Prospect	N/A	42.28070908	-72.97841271	G80	Prospect Street
L-Prospect	N/A	42.28077049	-72.97855982	G82	Prospect Street
U-prospect H32	N/A	42.28244669	-72.97848639	G83	Prospect Street
Cooper H35	N/A	42.28612389	-72.97982526	G84	Prospect Street
Cemetery	N/A	42.27729133	-72.99301073	G86	Cemetery Road @ Route 20
Cemetery H51	N/A	42.2772872	-72.99299375	G87	Cemetery Road @ Route 20
Cemetery	N/A	42.2773024	-72.99299612	G88	Cemetery Road @ Route 20
Wade H49	N/A	42.26996185	-73.01461015	G89	Horn Pond Line
Albany Turnpike Valve 1	N/A	42.2708117	-73.00938809	G90	Horn Pond Line
R20 H36	N/A	42.27919262	-72.98194847	G91	Route 20
R20	N/A	42.27924799	-72.98211493	G92	Main St. @ Route 20
R20	N/A	42.27924153	-72.98209329	G93	Main St. @ Route 20
R20-Main St	N/A	42.27925406	-72.98209869	G94	Main St. @ Route 20
Main St	N/A	42.2793908	-72.98199221	G95	Main Street
R20 Scool	N/A	42.27940111	-72.98279416	G96	School Street @ Route 20
R20	N/A	42.27938741	-72.9826738	G97	Middlefield Road @ Route 20
R20	N/A	42.27938438	-72.98264932	G98	Middlefield Road @ Route 20
R20-Middlefield	N/A	42.27939419	-72.98265846	G99	Middlefield Road @ Route 20
R20-Middlefield	N/A	42.27937716	-72.98254929	G100	Middlefield Road @ Route 20
R20	N/A	42.27936834	-72.98252982	G101	Middlefield Road @ Route 20
R20 H37	N/A	42.27822246	-72.98064093	G102	Route 20
R20 H38	Paved over	42.27765122	-72.97916355	G103	Route 20
R20 H39	N/A	42.27749498	-72.97775196	G104	Route 20
R20 H40	N/A	42.27688084	-72.97604088	G105	Route 20
R20 H41	N/A	42.27624348	-72.97439016	G106	Route 20
R20	N/A	42.27629692	-72.97451714	G107	Bay State @ Route 20
R20-Baystate	N/A	42.27630712	-72.97451914	G108	Bay State @ Route 20
R20 H42	N/A	42.27571597	-72.97298968	G109	Route 20
R20	N/A	42.27571503	-72.97297161	G110	Route 20
Baystate 43	N/A	42.27689026	-72.97364805	G111	Bay State Drive
Baystate Building Feed	Has 2 valves	42.2769825	-72.97340011	G112	Bay State Drive
Baystate Pole-14-28	N/A	42.27491347	-72.97018887	G113	Bay State Drive
Baystate 44	N/A	42.27348015	-72.9685932	G114	Bay State Drive
RoundHill H45	N/A	42.27155369	-72.96857845	G115	Route 20
Cemetery	N/A	42.27599213	-73.00047598	G116	Horn Pond Line
Cemetery	N/A	42.27592236	-73.00071819	G117	Horn Pond Line
Deer Trail H53	N/A	42.27366458	-73.0022225	G118	Horn Pond Line
Blow off	N/A	42.2750424	-73.02177542	G119	Horn Pond Line
Horn Pond Exit	N/A	42.27960675	-73.0221801	G120	Horn Pond Line
Horn Pond Entrence	N/A	42.2796321	-73.0222075	G121	Horn Pond Line
MapleA H28	N/A	42.27893835	-72.97789552	G122	Maple Avenue
Old Maple feed	N/A	42.27882399	-72.98038922	G123	Main St. / Route 20 Cross Country
N/A	U-Prospect	42.28069237	-72.9784104	G124	Prospect Street
L-Prospect 4inch	N/A	42.28088151	-72.97882466	G125	Prospect Street
U-Prospect H34	Guess (hurried)	42.28459212	-72.97928472	G126	Prospect Street
U-Prospect H33	4"	42.28258016	-72.97903819	G127	Prospect Street
6" Isolation	N/A	42.2828045	-72.97912582	G128	Prospect Street

CWD Label	CWD Comments	Latitude	Longitude	GateValveID	Location
R20 H46	N/A	42.26954644	-72.96704722	G129	Route 20
R20 H47	N/A	42.26780055	-72.9654394	G130	Route 20
R20 48	N/A	42.26684152	-72.96392343	G131	Route 20
Baystate/Emery Isolation ?	N/A	42.2771046	-72.97074357	G132	Bay State Drive
Baystate "???"	N/A	42.27701499	-72.97342136	G133	Bay State Drive
Middlefield Main	N/A	42.28182225	-72.98285971	G134	Middlefield Road
William something	N/A	42.28364086	-72.98535391	G135	William St
N/A	N/A	42.28762288	-72.98447179	G136	Middlefield Road
Blowoff unproven	Bottom left corner (black)	42.28641969	-72.97976424	G137	Prospect Street

**APPENDIX O –  
CURB STOP INVENTORY**

CWD Label	CWD Comments	Latitude	Longitude	Curb Stop ID	Location
Center Church	Corner stone church	42.2795841	-72.98240815	2	Middlefield Road
Baker 12	Baker Rd closer to town hall.	42.27989596	-72.98257625	3	Middlefield Road
Baker 10	Baker Rd further from town hall	42.27988634	-72.98257514	4	Middlefield Road
Center Old School	10 middle field street	42.27991951	-72.98273722	5	Middlefield Road
N/A	14 Middlefield St	42.28043252	-72.98280081	6	Middlefield Road
Town Hall	15 Middlefield	42.28012239	-72.98262078	7	Middlefield Road
Middlefield 24	24 Middlefield	42.28091959	-72.9828598	8	Middlefield Road
Middlefield 28	28 Middlefield	42.28122024	-72.98290497	9	Middlefield Road
Middlefield 56/58	56 Middlefield	42.28259278	-72.98297314	12	Middlefield Road
Middlefield 59	59 Middlefield	42.28252659	-72.98283533	13	Middlefield Road
Middlefield 57	57 Middlefield	42.28241229	-72.98283643	14	Middlefield Road
RR	N/A	42.2789503	-72.98976569	15	Reservoir Drive @ Route 20
Town Highway	N/A	42.27741018	-72.98019518	16	Town Road
R20 166	N/A	42.28020393	-72.98485552	17	William St
R20 172	N/A	42.2801119	-72.9847707	18	William St
William 1	N/A	42.28027024	-72.98473601	19	William St
William 4	N/A	42.28061228	-72.98483155	20	William St
William 7	N/A	42.28063294	-72.98473353	21	William St
William 9	N/A	42.28082075	-72.98476965	22	William St
William 11	N/A	42.28101815	-72.98478935	23	William St
William 8	N/A	42.28120847	-72.98494383	24	William St
William 13	N/A	42.28127202	-72.98484665	25	William St
William 25	N/A	42.28279191	-72.9851824	26	William St
William 28	N/A	42.28313784	-72.98534197	27	William St
Middlefield 106	N/A	42.28593749	-72.98290854	28	Middlefield Road
Olin 10	N/A	42.28634997	-72.98405513	29	Olin Avenue
Olin 11	N/A	42.28638484	-72.98417052	30	Olin Avenue
Olin 14	N/A	42.28621825	-72.98499243	31	Olin Avenue
Olin 17	N/A	42.28628973	-72.98496929	32	Olin Avenue
Middlefield Mill	N/A	42.28705161	-72.98389906	33	Middlefield Road
Middlefield 156	N/A	42.28844907	-72.98462444	34	Middlefield Road
Middlefield 166	N/A	42.28935818	-72.98460674	35	Middlefield Road
Riverfront 15	N/A	42.28096126	-72.98061431	36	Riverfront Street
Riverfront 17	N/A	42.28107843	-72.98058952	37	Riverfront Street
Riverfront 12	N/A	42.28075545	-72.98077204	38	Riverfront Street
Riverfront 11	N/A	42.28077769	-72.98064798	39	Riverfront Street
Main 20	N/A	42.28010978	-72.98063144	40	Riverfront Street
Main 13	N/A	42.27979045	-72.98060648	41	Main Street
Main 15	N/A	42.27979496	-72.98059549	42	Main Street
Main 26	N/A	42.28011428	-72.97984084	43	Main Street
A&L Market	N/A	42.27988044	-72.97966824	44	Main Street
Maple 4&6	N/A	42.27968469	-72.97955025	45	Main Street
Maple 5	N/A	42.27958988	-72.979698	46	Main Street
Andrews 5	N/A	42.2790509	-72.97925048	47	Main Street
Maple 23	N/A	42.27866496	-72.97989943	48	Main St. / Route 20 Cross Country
Maple 15	N/A	42.27881818	-72.97950751	49	Main Street
Maple 19	N/A	42.27878336	-72.97947977	50	Main Street
Maple 11	N/A	42.27913133	-72.97949405	51	Main Street
Maple 21	N/A	42.27863013	-72.97924966	52	Main Street
Maple 25	N/A	42.27848017	-72.97917914	53	Main Street
Maple Ave 26	N/A	42.27867855	-72.97881294	54	Maple Avenue
Maple A27	N/A	42.27872067	-72.97866679	55	Maple Avenue
Maple A29	N/A	42.27875465	-72.97850379	56	Maple Avenue
Maple A31	N/A	42.27884011	-72.97822146	57	Maple Avenue
Maple A33	N/A	42.27886601	-72.97812504	58	Maple Avenue
Maple A35	N/A	42.27891885	-72.97793018	59	Maple Avenue
Maple A32	N/A	42.27896799	-72.9780338	60	Maple Avenue
Andrews 7	N/A	42.27887633	-72.97836348	61	Maple Avenue

CWD Label	CWD Comments	Latitude	Longitude	Curb Stop ID	Location
Maple A30	N/A	42.27884491	-72.97850444	62	Maple Avenue
Prospect 158 4" (Private Well)	N/A	42.28277626	-72.97893754	63	Prospect Street
Prospect 138 4"	N/A	42.28278081	-72.97893653	64	Prospect Street
Prospect 108	N/A	42.2859487	-72.97971458	65	Prospect Street
Cemetery	N/A	42.27543633	-72.99403036	66	Cemetery Road
CS-1-S	N/A	42.27547433	-72.99409755	67	Cemetery Road
CS2-S	N/A	42.27485873	-72.99637688	68	Cemetery Road
Cemetery 2	N/A	42.27484904	-72.99637736	69	Cemetery Road
CS3-S	N/A	42.2752007	-72.99729269	70	Cemetery Road
Cemetery 3	N/A	42.27519157	-72.99729838	71	Cemetery Road
Cemetery 4	N/A	42.27568633	-72.99888511	72	Cemetery Road
CS4-S	N/A	42.27568885	-72.99888416	73	Cemetery Road
Albany turnpike BlowOff	N/A	42.270792	-73.00950798	74	Horn Pond Line
Baystate Pole-14-28	N/A	42.2749092	-72.97015956	75	Bay State Drive
Baystate 8 (Longley)	N/A	42.27403291	-72.96907986	76	Bay State Drive
Baystate 91	N/A	42.27282873	-72.96883515	77	Bay State Drive
Baystate 91	N/A	42.27158296	-72.96858848	78	Route 20
Horn pond inlet	N/A	42.28198807	-73.02435364	79	Horn Pond
Maple 28	N/A	42.2788297	-72.97915037	80	Main Street
Maple 14	N/A	42.27914188	-72.97929772	81	Main Street
Maple 12	N/A	42.27925387	-72.97935526	82	Main Street
Maple 10	N/A	42.27940852	-72.97942918	83	Main Street
Maple 9	N/A	42.27932473	-72.97959193	84	Main Street
Maple 7	N/A	42.27954209	-72.97966562	85	Main Street
16/18 Maple	N/A	42.27894277	-72.97920435	86	Main Street
Riverfront 19	N/A	42.28120794	-72.98057134	87	Riverfront Street
Riverfront 5/7/9	N/A	42.28043137	-72.98067946	88	Riverfront Street
Main 14	N/A	42.279678	-72.98155072	89	Main Street
Main 6	N/A	42.27962587	-72.98161582	90	Main Street
Main 4	N/A	42.27956092	-72.98181731	91	Main Street
Main 5	N/A	42.27936775	-72.98181223	92	Main Street
Main 29	N/A	42.28006631	-72.97949326	93	Main Street
Emery 101	N/A	42.27740535	-72.9702358	94	Emery Street
Emery 101	N/A	42.27751204	-72.97014787	95	Emery Street
Emery 102	N/A	42.27751027	-72.97013857	96	Emery Street
Emery abandoned	N/A	42.2795485	-72.97545308	97	Emery Street
Emery Abandoned	N/A	42.27954569	-72.97545731	98	Emery Street
Emery Ball lot ?	N/A	42.2791849	-72.97720418	99	Emery Street
Emery 12	N/A	42.27935584	-72.97737795	100	Emery Street
Emery 6	N/A	42.27953216	-72.97750735	101	Emery Street
Emery 2	N/A	42.27970148	-72.9776552	102	Emery Street
Transfer Station	N/A	42.2803946	-72.97831153	103	Prospect Street
L-Prospect 31 4"	N/A	42.28171393	-72.97944829	104	Prospect Street
L-Prospect 44 4"	N/A	42.28209359	-72.97977236	105	Prospect Street
L-prospect 71	N/A	42.28409763	-72.9803922	106	Prospect Street
L-Prospect 77	N/A	42.28419579	-72.98041157	107	Prospect Street
L-Prospect 100	N/A	42.28606453	-72.98014264	108	Prospect Street
L-Prospect 91	N/A	42.28528325	-72.98010841	109	Prospect Street
U-Prospect 114	N/A	42.28517888	-72.97942492	110	Prospect Street
U-Prospect 121	N/A	42.28474217	-72.97941644	111	Prospect Street
U-Prospect 128	N/A	42.28437812	-72.97915774	112	Prospect Street
U-prospect 129 (Buried)	N/A	42.28444491	-72.97932151	113	Prospect Street
U-Prospect 134	N/A	42.28395638	-72.97913016	114	Prospect Street
L-Prospect 61	N/A	42.28353925	-72.97931136	115	Prospect Street
U-Prospect 149	N/A	42.28314668	-72.97926197	116	Prospect Street
U-Prospect 155	N/A	42.28244563	-72.97869593	117	Prospect Street
U-Prospect 155	N/A	42.28266135	-72.97902714	118	Prospect Street
U-Prospect 14 2" C	N/A	42.28236531	-72.97853614	119	Prospect Street

CWD Label	CWD Comments	Latitude	Longitude	Curb Stop ID	Location
U-Prospect 160 4"	N/A	42.28223994	-72.97836352	120	Prospect Street
U-Prospect 164 4"	N/A	42.28218675	-72.97842475	121	Prospect Street
U-Prospect 166 4"	N/A	42.28193915	-72.97847188	122	Prospect Street
U-Prospect 171 4"	N/A	42.28212589	-72.97932677	123	Prospect Street
Emery Isolation	N/A	42.27706303	-72.97092951	124	Bay State Drive
Baystate Osterman	N/A	42.27722331	-72.97284852	125	Bay State Drive
R20 Fire Station 300	N/A	42.27648763	-72.9745318	126	Bay State @ Route 20
Middlefield 32	N/A	42.28152662	-72.98293467	127	Middlefield Road
Middlefield 36	N/A	42.28152003	-72.98293248	128	Middlefield Road
William 10	N/A	42.28167539	-72.98504197	129	William St
William 20	N/A	42.28227181	-72.98515643	130	William St
William 18	N/A	42.28227009	-72.9851564	131	William St
William 19	N/A	42.28213105	-72.9850258	132	William St
William 21	N/A	42.28243657	-72.98510965	133	William St
William 24	N/A	42.28276198	-72.98528779	134	William St
William 22	N/A	42.28266325	-72.98529922	135	William St
William 23	N/A	42.28273674	-72.9851441	136	William St
William 29	N/A	42.28316311	-72.9852414	137	William St
William 31	N/A	42.28359456	-72.98533284	138	William St
William 30	N/A	42.28401684	-72.98554985	139	William St
N/A	N/A	42.27896789	-72.97802824	142	Maple Avenue
35 Maple St	N/A	42.27889374	-72.9779903	143	Maple Avenue
N/A	N/A	42.27883438	-72.97826974	144	Maple Avenue
N/A	N/A	42.27884708	-72.97854457	145	Maple Avenue
N/A	N/A	42.27874752	-72.97852158	146	Maple Avenue
N/A	N/A	42.2787048	-72.97867663	147	Maple Avenue
26 Maple St	N/A	42.27866448	-72.97881615	148	Maple Avenue
23 Maple St	N/A	42.27847584	-72.97922881	149	Main Street
5 Andrews Ave	N/A	42.27906738	-72.97922611	150	Main Street
6 Copper drive	Under brick	42.28636327	-72.97974	151	Prospect Street
Feed to lower	N/A	42.28420723	-72.97938519	152	Prospect Street

**APPENDIX P –  
LAND USE CODE DESCRIPTIONS**

USE_CODE_1	USE_DESC	Category	Score
1020	Residential Condominium	Single Family	2
1320	Undevelopable Residential Land	Empty/Vacant Land	1
1010	Single Family Residential	Single Family	2
9320	Vacant, Conservation (Municipal or County)	Land Conservation	4
1300	Developable Residential Land	Empty/Vacant Land	1
9300	Vacant, Selectmen or City Council (Municipal)	Empty/Vacant Land	1
1090	Multiple Houses on one parcel	Multi Family	3
9380	Vacant, District (County)	Empty/Vacant Land	1
310	Mixed Use (Primarily Commercial, some Residential)	Mixed Use	3
3160	Other Storage, Warehouse, and Distribution facilities (see also usecode 401)	Business	3
3900	Developable Commercial Land	Empty/Vacant Land	1
3320	Auto Repair Facilities	Business	3
3430	Business Condo	Business	3
3920	Undevelopable Commercial Land	Empty/Vacant Land	1
4310	Telephone Relay Towers	Utility	5
3400	General Office Buildings	Business	3
4000	Buildings for manufacturing operations	CDC Tier 2	4
3180	Commercial Greenhouses	Agricultural/Horticultural	5
3250	Small Retail and Services stores (under 10,000 sq. ft.)	Business	3
9290	Comm. Of Mass. (Other, non-reimbursable)	State land	4
9390	Improved, District (County)	Improved land	2
1040	Two-Family Residential	Multi Family	3
1060	Accessory Land with Improvement	Improved land	2
7190	Nurseries (Ch. 61A, not classified as Open Space)	Agricultural/Horticultural	5
170	Mixed Use (Primarily Residential, some Agriculture)	Mixed Use	3
1120	Apartments with More than Eight Units	Multi Family	3
9700	Housing Authority	Multi Family	3
3230	Shopping Centers/Malls	CDC Tier 2	4
8030	Nature Study - areas specifically for nature study or observation (Ch. 61B, not classified as Open Space)	Land Conservation	4
9820	Vacant, Conservation, Other City or Town	Land Conservation	4
9240	Mass. Highway Dept. (MHD) (non-reimbursable)	State land	4
9350	Improved, Municipal Public Safety	Improved land	2
3340	Gasoline Service Stations - providing engine repair or maintenance services, and fuel products	Business	3
3260	Eating and Drinking Establishments - restaurants, diners, fast food establishments, bars, nightclubs	Business	3
3690	Other Cultural and Entertainment Properties	CDC Tier 2	4
9310	Improved, Selectmen or City Council (Municipal)	Improved land	2
9950	Other, Open Space	Empty/Vacant Land	1
9500	Vacant, Conservation Organizations (Charitable Org.)	Charitable	4
9100	Dept. of Conservation and Recreation (DCR), Division of State Parks and Recreation	Land Conservation	4
3170	Farm Buildings - barns, silo, utility shed, etc	Agricultural/Horticultural	5
9530	Cemeteries (Charitable Org.)	Charitable	4
3370	Parking Lots - a commercial open parking lot for motor vehicles	Empty/Vacant Land	1
3500	Property Used for Postal Services	Business	3
1250	Other Congregate Housing (includes non-transient shared living arrangements)	Multi Family	3
9510	Other (Charitable Org.)	Charitable	4
4230	Electric Transmission Right-of-Way	Utility	5
9110	Dept. of Fish and Game (DFG) -- formerly Division of Fisheries and Wildlife, Environmental Law Enforcement (DFWELE)	State Land	4
7170	Productive Woodland - woodlots (Ch. 61A, not classified as Open Space)	Empty/Vacant Land	1
470	Mixed Use (Primarily Industrial, some Agriculture)	Mixed Use	3
4100	Sand and Gravel Mining/Quarry	Empty/Vacant Land	1
9010	Commercial-Mass	Business	3
9460	Vacant (Educational Private)	Empty/Vacant Land	1
3010	Motels	CDC Tier 2	4
4320	Cable TV Transmitting Facilities	Utility	5
9000	United States Government	Federal Land	5
1110	Apartments with Four to Eight Units	Multi Family	3
160	Mixed Use (Primarily Residential, some Forest)	Mixed Use	3
7100	Cranberry Bog (Ch. 61A, not classified as Open Space)	Agricultural/Horticultural	5
130	Mixed Use (Primarily Residential, some Commercial)	Mixed Use	3
7160	Necessary related land-farm roads, ponds, land under farm buildings (Ch. 61A, not classified as Open Space)	Agricultural/Horticultural	5
1050	Three-Family Residential	Multi Family	3
3220	Discount Stores, Junior Department Stores, Department Stores	Business	3
3530	Fraternal Organizations	Multi Family	3
3350	Car Wash Facilities	Business	3
9610	Rectory or Parsonage	Religious Groups	4
9540	Function Halls, Community Centers, Fraternal Organizations (Charitable Org.)	CDC Tier 2	4
9600	Church, Mosque, Synagogue, Temple, etc...	Religious Groups	4
9040	(formerly Colleges, Schools(private). Removed June 2009. )	CDC Tier 2	4
9060	(formerly Religious Organizations. Removed June 2009.)	Religious Groups	4
9580	Recreation, Active Use (Charitable Org.)	Charitable	4
4280	Gas Pressure Control Stations	Utility	5
9360	Vacant, Tax Title/Treasurer	Empty/Vacant Land	1
9210	Dept. of Fish and Game, Environmental Law Enforcement (DFG, formerly DFWELE) (non-reimbursable)	State land	4
9590	Housing, Other (Charitable Org.)	Charitable	4
4300	Telephone Exchange Stations	Utility	5
3040	Nursing Homes - includes property designed for minimal care with or without medical facilities	CDC Tier 1	5
9220	Dept. of Corrections (DOC) - Division of Youth Services,Mass. Military,State Police,Sheriffs' Depts. (non-reimbursable)	State land	4
9970	Other	Other	2
9340	Improved, Education (Municipal or County)	CDC Tier 1	5

USE CODE 1	USE_DESC	Category	Score
4040	Research and Development facilities	Business	3
3420	Medical Office Buildings	CDC Tier 1	5
3050	Private Hospitals	CDC Tier 1	5
3560	Miscellaneous Public Services - professional membership organizations, business associations, etc	Business	3
6010	All land designated under Chapter 61 (not classified as Open Space)	Empty/Vacant Land	1
3840	Marinas - including marine terminals & associated areas primarily for recreational marine craft (not Ch. 61B)	Water	4
3410	Bank Buildings	Business	3
3700	Bowling Alleys	Business	3
9420	College or University (Educational Private)	CDC Tier 2	4
9170	Dept. of Education (DOE) - UMass., State Colleges, Community Colleges	CDC Tier 2	4
3860	Camping Facilities - accomodations for tents, campers, or travel trailers (not Ch. 61B)	Business	3
3550	Funeral Homes	Business	3
3300	Automotive Vehicles Sales and Service	Business	3
4400	Developable Industrial Land	Empty/Vacant Land	1
4240	Electricity Regulating Substations	Utility	5
7200	Wet land, scrub land, rock land (Ch. 61A, not classified as Open Space)	Water	4
3750	Tennis and/or Racquetball Clubs	Business	3
9330	Vacant, Education (Municipal or County)	Empty/Vacant Land	1
3380	Other Motor Vehicles Sales and Services	Business	3
8140	Target Shooting - areas for target shooting such as archery, skeet or approved fire-arms (Ch. 61B, not classified as OS)	Empty/Vacant Land	1
380	Mixed Use (Primarily Commercial, some Recreation)	Mixed Use	3
830	Mixed Use (Primarily Recreation, some Commercial)	Mixed Use	3
3800	Golf Courses (not Ch. 61B)	Empty/Vacant Land	1
3880	Other Outdoor facilities - e.g. driving ranges, miniature golf, baseball batting ranges, etc... (not Ch. 61B)	Business	3
9430	Other Educational (Educational Private)	CDC Tier 1	5
3520	Day Care Centers, Adult (see also Code 140)	CDC Tier 1	5
4010	Warehouses for storage of manufactured products	CDC Tier 2	4
8110	Swimming Areas (Ch. 61B, not classified as Open Space)	Water	4
1030	Mobile Home (includes mobile home park land)	Multi Family	3
8010	Hiking - trails or paths, Camping - areas with sites for overnight camping, Nature Study (Ch. 61B, not classified as OS)	Empty/Vacant Land	1
810	Mixed Use (Primarily Recreation, some Residential)	Mixed Use	3
8050	Golfing - areas of land arranged as a golf course (Ch. 61B, not classified as Open Space)	Empty/Vacant Land	1
9940	Improved County or Regional Association Commission	Improved land	2
3310	Automotive Supplies Sales and Service	Business	3
9910	Vacant, County or Regional	Empty/Vacant Land	1
9230	Dept. of Public Health (DPH) - Soldiers' Homes, Dept. of Mental Health (DMH) - Dept. of Mental Retardation (non-reimburs	CDC Tier 1	5
9160	Military Division - Campgrounds	Federal Land	5
180	Mixed Use (Primarily Residential, some Recreation)	Mixed Use	3
3930	Agricultural/Horticultural Land not included in Chapter 61A	Agricultural/Horticultural	5
4200	Utility Tanks	Utility	5
3870	Summer Camps - children's camps (not Ch. 61B)	Empty/Vacant Land	1
4500	Electric Generation Plants	Utility	5
9030	Municipal	Empty/Vacant Land	1
9050	Municipal	Empty/Vacant Land	1

**APPENDIX Q –  
FUNDING ANALYSIS PRINTOUTS**

**Tighe&Bond**

**3 - Year Plan**



## Water Enterprise

	Budget FY23	Budget FY24	Budget FY25	Projected FY26	Projected FY27	Projected FY28	Projected FY29	Projected FY30
<b>Operating Expenses</b>								
Salaries & Wages	\$ 44,805	\$ 65,765	\$ 75,822	\$ 65,237	\$ 68,499	\$ 71,924	\$ 75,520	\$ 79,296
Operation & Maintenance	\$ 43,000	\$ 45,150	\$ 75,000	\$ 57,103	\$ 59,958	\$ 62,956	\$ 66,103	\$ 69,408
Purchase Of Services	\$ 24,000	\$ 25,200	\$ -	\$ 25,830	\$ 27,122	\$ 28,478	\$ 29,901	\$ 31,397
Prior Year Expenses	\$ -	\$ 5,888	\$ 621	\$ 3,254	\$ 3,254	\$ 3,254	\$ 3,254	\$ 3,254
Budget Surplus	\$ -	\$ 13,083	\$ 15,000	\$ 14,744	\$ 15,481	\$ 16,255	\$ 17,068	\$ 17,921
<b>Subtotal</b>	<b>\$ 111,805</b>	<b>\$ 155,086</b>	<b>\$ 166,443</b>	<b>\$ 166,168</b>	<b>\$ 174,313</b>	<b>\$ 182,866</b>	<b>\$ 191,847</b>	<b>\$ 201,277</b>
<i>Delta Previous</i>		▲ 38.7%	▲ 7.3%	▼ 0.2%	▲ 4.9%	▲ 4.9%	▲ 4.9%	▲ 4.9%
<b>Capital Expenses</b>								
Capital Outlay			\$ -	\$ 368,000	\$ 169,000	\$ 221,000	\$ 92,000	\$ 92,000
Existing Debt Service	\$ 29,479	\$ 29,479	\$ 120,100	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000
New Debt Service		\$ -	\$ -	\$ 20,040	\$ 33,496	\$ 32,502	\$ 31,508	\$ 30,514
<b>Subtotal</b>	<b>\$ 29,479</b>	<b>\$ 29,479</b>	<b>\$ 120,100</b>	<b>\$ 418,040</b>	<b>\$ 232,496</b>	<b>\$ 283,502</b>	<b>\$ 153,508</b>	<b>\$ 152,514</b>
<i>Delta Previous</i>			▲ 307.4%	▲ 248.1%	▼ 44.4%	▲ 21.9%	▼ 45.9%	▼ 0.6%
<b>TOTAL EXPENSES</b>	<b>\$ 141,284</b>	<b>\$ 184,565</b>	<b>\$ 286,543</b>	<b>\$ 584,208</b>	<b>\$ 406,809</b>	<b>\$ 466,368</b>	<b>\$ 345,354</b>	<b>\$ 353,790</b>
		▲ 30.6%	▲ 55.3%	▲ 103.9%	▼ 30.4%	▲ 14.6%	▼ 25.9%	▲ 2.4%
	<i>Actual</i>	<i>Actual</i>	<i>Actual</i>	<i>Projected</i>	<i>Projected</i>	<i>Projected</i>	<i>Projected</i>	<i>Projected</i>
<b>RATE REVENUE</b>	\$ 122,586	\$ 137,537	\$ 214,471	\$ 508,296	\$ 508,296	\$ 508,296	\$ 508,296	\$ 508,296
<b>NON-RATE REVENUE</b>	\$ -	\$ 73,914	\$ 34,229	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000
		<i>Revenue Increase</i>	▲ 0%	▲ 137%	▲ 0%	▲ 0%	▲ 0%	▲ 0%
<b>Fund Balance (Beginning)</b>		\$ 22,982	\$ 114,073	\$ 76,230	\$ 25,318	\$ 151,806	\$ 218,734	\$ 406,676
Net Revenue		\$ 26,886	\$ (37,843)	\$ 317,089	\$ 295,487	\$ 287,928	\$ 279,942	\$ 271,506
Capital Outlay		\$ -	\$ -	\$ (368,000)	\$ (169,000)	\$ (221,000)	\$ (92,000)	\$ (92,000)
<b>Fund Balance (End)</b>		\$ 49,868	\$ 76,230	\$ 25,318	\$ 151,806	\$ 218,734	\$ 406,676	\$ 586,182
(as % OpEx)		32%	46%	15%	87%	120%	212%	291%
Days of OpEx as Enterprise Reserve		98.6	97.1	55.6	317.9	436.6	773.7	1063.0
Months of OpEx as Enterprise Reserve		3.3	3.2	1.9	10.6	14.6	25.8	35.4

Capital Improvement Planner										
ID	System	Scope	Description	Funding source	Interest Rate	Estimated Cost	Cost Year	Escalated Cost	Start Year	Term
1	Source	Eng.+Const.	Austin Brook Screen Upgrade	Rate	--	\$ 48,000	2025	\$ 52,000	2026	1
2	Source	Eng.+Const.	Austin Brook Access Improvements	Rate	--	\$ 48,000	2025	\$ 52,000	2026	1
3	Source	Eng.+Const.	Horn Pond Screen Upgrade	Debt	7.0%	\$ 80,000	2026	\$ 80,000	2026	20
4	Source	Eng.+Const.	Horn Pond Inlet Pipe Inspection	Rate	--	\$ 24,000	2025	\$ 26,000	2026	1
5	Source	Eng.+Const.	Horn Pond Inlet Line Replacement/Repair	Rate	--	\$ 80,000	2025	\$ 87,000	2026	1
6	Source	Eng.+Const.	Horn Pond Lands/Property Purchase Around Pond	Debt	7.0%	\$ 80,000	2025	\$ 87,000	2026	20
7	Treatment	Eng.+Const.	Raw Water Replacement of Raw Water Check Valve	Rate	--	\$ 24,000	2025	\$ 26,000	2026	1
8	Treatment	Eng.+Const.	Raw Water Replacement of Raw Water Pre-Filter	Rate	--	\$ 24,000	2025	\$ 26,000	2026	1
9	Treatment	Eng.+Const.	Raw Water Austin Brook Engineering Pumping Report	Rate	--	\$ 25,000	2025	\$ 27,000	2026	1
10	Enterprise	Eng.+Const.	Water Enterprise On-Call GIS Water Department	Rate	--	\$ 4,000	2025	\$ 5,000	2026	20
11	Enterprise	Eng.+Const.	Water Enterprise GIS Yearly Subscription	Rate	--	\$ 1,000	2025	\$ 2,000	2026	20
12	Source	Eng.+Const.	Austin Brook Hoist Replacement	Rate	--	\$ 24,000	2025	\$ 26,000	2026	1
13	Treatment	Eng.+Const.	Water Treatment Plant Replacement of Pipe Supports	Rate	--	\$ 24,000	2025	\$ 26,000	2026	1
14	Distribution	Eng.+Const.	Central Leak Detection	Rate	--	\$ 6,000	2025	\$ 7,000	2026	1
15	Distribution	Eng.+Const.	Eastern Leak Detection	Rate	--	\$ 5,000	2025	\$ 6,000	2026	1
16	Treatment	Eng.+Const.	Water Treatment Plant DBP Study	Rate	--	\$ 30,000	2025	\$ 35,000	2027	1
17	Source	Eng.+Const.	Horn Pond Horn Pond Maintenance/Access Evaluation	Rate	--	\$ 40,000	2025	\$ 47,000	2027	1
18	Treatment	Eng.+Const.	Water Treatment Plant Replacement of Back Flow Preventer	Rate	--	\$ 7,000	2025	\$ 9,000	2027	1
19	Treatment	Eng.+Const.	Filter/Clearwell Structural Rehab	Debt	7.0%	\$ 100,000	2025	\$ 117,000	2027	20
20	Treatment	Eng.+Const.	Former Chlorination Building Buidling Sealing	Rate	--	\$ 16,000	2025	\$ 19,000	2027	1
21	Source	Eng.+Const.	Austin Brook Phase I Dam Inspection	Rate	--	\$ 10,000	2025	\$ 12,000	2027	1
22	Treatment	Eng.+Const.	Filter/Clearwell Site Lighting Upgrade	Rate	--	\$ 24,000	2025	\$ 28,000	2027	1
23	Distribution	Eng.+Const.	Western Leak Detection	Rate	--	\$ 10,000	2025	\$ 12,000	2027	1
24	Source	Eng.+Const.	Austin Brook Reservoir Maintenance	Rate	--	\$ 24,000	2025	\$ 31,000	2028	1
25	Source	Eng.+Const.	Horn Pond/Austin Brook Pre-Oxidant Study	Rate	--	\$ 40,000	2025	\$ 51,000	2028	1
26	Treatment	Eng.+Const.	Water Treatment Plant Surface Prep and Paintings of Valves	Rate	--	\$ 16,000	2025	\$ 21,000	2028	1
27	Distribution	Engineering	Annual Water Main Replacement	Rate	--	\$ 67,000	2025	\$ 85,000	2028	20
28	Treatment	Eng.+Const.	Filter/Clearwell Structural Inspection of Filters and Clearwell	Rate	--	\$ 20,000	2025	\$ 26,000	2028	1
						<b>Total</b>		<b>\$ 901,000</b>	<b>\$ 1,028,000</b>	



**Tighe&Bond**

**15 - Year Plan**



## Water Enterprise

	Budget FY23	Budget FY24	Budget FY25	Projected FY26	Projected FY27	Projected FY28	Projected FY29	Projected FY30
<b>Operating Expenses</b>								
Salaries & Wages	\$ 44,805	\$ 65,765	\$ 75,822	\$ 65,237	\$ 68,499	\$ 71,924	\$ 75,520	\$ 79,296
Operation & Maintenance	\$ 43,000	\$ 45,150	\$ 75,000	\$ 57,103	\$ 59,958	\$ 62,956	\$ 66,103	\$ 69,408
Purchase Of Services	\$ 24,000	\$ 25,200	\$ -	\$ 25,830	\$ 27,122	\$ 28,478	\$ 29,901	\$ 31,397
Prior Year Expenses	\$ -	\$ 5,888	\$ 621	\$ 3,254	\$ 3,254	\$ 3,254	\$ 3,254	\$ 3,254
Budget Surplus	\$ -	\$ 13,083	\$ 15,000	\$ 14,744	\$ 15,481	\$ 16,255	\$ 17,068	\$ 17,921
<b>Subtotal</b>	<b>\$ 111,805</b>	<b>\$ 155,086</b>	<b>\$ 166,443</b>	<b>\$ 166,168</b>	<b>\$ 174,313</b>	<b>\$ 182,866</b>	<b>\$ 191,847</b>	<b>\$ 201,277</b>
		<i>Delta Previous</i>						
			▲ 38.7%	▲ 7.3%	▼ 0.2%	▲ 4.9%	▲ 4.9%	▲ 4.9%
<b>Capital Expenses</b>								
Capital Outlay			\$ -	\$ 7,000	\$ 7,000	\$ 139,000	\$ 172,000	\$ 161,000
Existing Debt Service	\$ 29,479	\$ 29,479	\$ 120,100	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000
New Debt Service		\$ -	\$ -	\$ -	\$ -	\$ 12,120	\$ 11,767	\$ 11,413
<b>Subtotal</b>	<b>\$ 29,479</b>	<b>\$ 29,479</b>	<b>\$ 120,100</b>	<b>\$ 37,000</b>	<b>\$ 37,000</b>	<b>\$ 181,120</b>	<b>\$ 213,767</b>	<b>\$ 202,413</b>
		<i>Delta Previous</i>						
			▲ 307.4%	▼ 69.2%	▲ 0.0%	▲ 389.5%	▲ 18.0%	▼ 5.3%
<b>TOTAL EXPENSES</b>	<b>\$ 141,284</b>	<b>\$ 184,565</b>	<b>\$ 286,543</b>	<b>\$ 203,168</b>	<b>\$ 211,313</b>	<b>\$ 363,986</b>	<b>\$ 405,613</b>	<b>\$ 403,690</b>
			▲ 30.6%	▲ 55.3%	▼ 29.1%	▲ 4.0%	▲ 72.2%	▲ 11.4%
	<i>Actual</i>	<i>Actual</i>	<i>Actual</i>	<i>Projected</i>	<i>Projected</i>	<i>Projected</i>	<i>Projected</i>	<i>Projected</i>
<b>TOTAL REVENUE</b>	<b>\$ 122,586</b>	<b>\$ 137,537</b>	<b>\$ 214,471</b>	<b>\$ 233,773</b>	<b>\$ 257,151</b>	<b>\$ 282,866</b>	<b>\$ 316,810</b>	<b>\$ 354,827</b>
<b>NON-RATE REVENUE</b>	<b>\$ -</b>	<b>\$ 73,914</b>	<b>\$ 34,229</b>	<b>\$ 25,000</b>	<b>\$ 25,000</b>	<b>\$ 25,000</b>	<b>\$ 25,000</b>	<b>\$ 25,000</b>
		<i>Revenue Increase</i>	▲ 0%	▲ 9%	▲ 10%	▲ 10%	▲ 12%	▲ 12%
<b>Fund Balance (Beginning)</b>	<b>\$ 22,982</b>	<b>\$ 114,073</b>	<b>\$ 76,230</b>	<b>\$ 131,835</b>	<b>\$ 202,673</b>	<b>\$ 146,552</b>	<b>\$ 82,749</b>	<b>\$ 82,749</b>
Net Revenue	\$ 26,886	\$ (37,843)	\$ 62,606	\$ 77,837	\$ 82,879	\$ 108,196	\$ 137,137	\$ 137,137
Capital Outlay	\$ -	\$ -	\$ (7,000)	\$ (7,000)	\$ (139,000)	\$ (172,000)	\$ (161,000)	\$ (161,000)
<b>Fund Balance (End)</b>	<b>\$ 49,868</b>	<b>\$ 76,230</b>	<b>\$ 131,835</b>	<b>\$ 202,673</b>	<b>\$ 146,552</b>	<b>\$ 82,749</b>	<b>\$ 58,886</b>	<b>\$ 58,886</b>
(as % OpEx)		32%	46%	79%	116%	80%	43%	29%
Days of OpEx as Enterprise Reserve		98.6	97.1	289.6	424.4	292.5	157.4	106.8
Months of OpEx as Enterprise Reserve		3.3	3.2	9.7	14.1	9.8	5.2	3.6

**Capital Improvement Planner**

ID	System	Scope	Description	Funding source	Interest Rate	Estimated Cost	Cost Year	Escalated Cost	Start Year	Term
1	Enterprise	Eng.+Const.	Water Enterprise On-Call GIS Water Department	Rate	--	\$ 4,000	2025	\$ 5,000	2026	20
2	Enterprise	Eng.+Const.	Water Enterprise GIS Yearly Subscription	Rate	--	\$ 1,000	2025	\$ 2,000	2026	20
3	Source	Eng.+Const.	Austin Brook Screen Upgrade	Rate	--	\$ 48,000	2025	\$ 61,000	2028	1
4	Source	Eng.+Const.	Horn Pond Screen Upgrade	Debt	7.0%	\$ 80,000	2025	\$ 101,000	2028	20
5	Source	Eng.+Const.	Raw Water Austin Brook Engineering Pumping Report	Rate	--	\$ 25,000	2025	\$ 32,000	2028	1
6	Distribution	Eng.+Const.	Central Leak Detection	Rate	--	\$ 6,000	2025	\$ 8,000	2028	1
7	Source	Eng.+Const.	Austin Brook Hoist Replacement	Rate	--	\$ 24,000	2025	\$ 31,000	2028	1
8	Treatment	Eng.+Const.	Raw Water Replacement of Raw Water Check Valve	Rate	--	\$ 24,000	2025	\$ 33,000	2029	1
9	Treatment	Eng.+Const.	Raw Water Replacement of Raw Water Pre-Filter	Rate	--	\$ 24,000	2025	\$ 33,000	2029	1
10	Source	Eng.+Const.	Austin Brook Access Improvements	Rate	--	\$ 48,000	2025	\$ 66,000	2029	1
11	Source	Eng.+Const.	Horn Pond Inlet Pipe Inspection	Rate	--	\$ 24,000	2025	\$ 33,000	2029	1
12	Source	Eng.+Const.	Horn Pond Inlet Line Replacement/Repair	Rate	--	\$ 80,000	2025	\$ 118,000	2030	1
13	Treatment	Eng.+Const.	Water Treatment Plant Replacement of Pipe Supports	Rate	--	\$ 24,000	2025	\$ 36,000	2030	1
14	Source	Eng.+Const.	Horn Pond Lands/Property Purchase Around Pond	Debt	7.0%	\$ 80,000	2025	\$ 127,000	2031	20
15	Distribution	Eng.+Const.	Eastern Leak Detection	Rate	--	\$ 5,000	2025	\$ 8,000	2031	1
16	Treatment	Eng.+Const.	Filter/Clearwell Structural Rehab	Debt	7.0%	\$ 100,000	2025	\$ 159,000	2031	20
17	Source	Eng.+Const.	Austin Brook Phase I Dam Inspection	Rate	--	\$ 10,000	2025	\$ 16,000	2031	1
18	Treatment	Eng.+Const.	Water Treatment Plant DBP Study	Rate	--	\$ 30,000	2025	\$ 48,000	2031	1
19	Source	Eng.+Const.	Horn Pond Horn Pond Maintenance/Access Evaluation	Rate	--	\$ 40,000	2025	\$ 87,000	2035	1
20	Treatment	Eng.+Const.	Water Treatment Plant Replacement of Back Flow Preventer	Rate	--	\$ 7,000	2025	\$ 17,000	2036	1
21	Treatment	Eng.+Const.	Former Chlorination Building Buidling Sealing	Rate	--	\$ 16,000	2025	\$ 38,000	2036	1
22	Distribution	Engineering	Annual Water Main Replacement	Rate	--	\$ 67,000	2025	\$ 157,000	2036	20
23	Treatment	Eng.+Const.	Filter/Clearwell Site Lighting Upgrade	Rate	--	\$ 24,000	2025	\$ 61,000	2037	1
24	Distribution	Eng.+Const.	Western Leak Detection	Rate	--	\$ 10,000	2025	\$ 26,000	2037	1
25	Treatment	Eng.+Const.	Filter/Clearwell Structural Inspection of Filters and Clearwell	Rate	--	\$ 20,000	2025	\$ 55,000	2038	1
26	Source	Eng.+Const.	Austin Brook Reservoir Maintenance	Rate	--	\$ 24,000	2025	\$ 77,000	2040	1
27	Source	Eng.+Const.	Horn Pond/Austin Brook Pre-Oxidant Study	Rate	--	\$ 40,000	2025	\$ 138,000	2041	1
28	Treatment	Eng.+Const.	Water Treatment Plant Surface Prep and Paintings of Valves	Rate	--	\$ 16,000	2025	\$ 60,000	2042	1
<b>Total</b>						<b>\$ 901,000</b>		<b>\$ 1,633,000</b>		



**Tighe&Bond**

**All Debt Plan**



## Water Enterprise

	Budget FY23	Budget FY24	Budget FY25	Projected FY26	Projected FY27	Projected FY28	Projected FY29	Projected FY30
<b>Operating Expenses</b>								
Salaries & Wages	\$ 44,805	\$ 65,765	\$ 75,822	\$ 65,237	\$ 68,499	\$ 71,924	\$ 75,520	\$ 79,296
Operation & Maintenance	\$ 43,000	\$ 45,150	\$ 75,000	\$ 57,103	\$ 59,958	\$ 62,956	\$ 66,103	\$ 69,408
Purchase Of Services	\$ 24,000	\$ 25,200	\$ -	\$ 25,830	\$ 27,122	\$ 28,478	\$ 29,901	\$ 31,397
Prior Year Expenses	\$ -	\$ 5,888	\$ 621	\$ 3,254	\$ 3,254	\$ 3,254	\$ 3,254	\$ 3,254
Budget Surplus	\$ -	\$ 13,083	\$ 15,000	\$ 14,744	\$ 15,481	\$ 16,255	\$ 17,068	\$ 17,921
<b>Subtotal</b>	<b>\$ 111,805</b>	<b>\$ 155,086</b>	<b>\$ 166,443</b>	<b>\$ 166,168</b>	<b>\$ 174,313</b>	<b>\$ 182,866</b>	<b>\$ 191,847</b>	<b>\$ 201,277</b>
<i>Delta Previous</i>		▲ 38.7%	▲ 7.3%	▼ 0.2%	▲ 4.9%	▲ 4.9%	▲ 4.9%	▲ 4.9%
<b>Capital Expenses</b>								
Capital Outlay			\$ -	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000
Existing Debt Service	\$ 29,479	\$ 29,479	\$ 120,100	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000
New Debt Service		\$ -	\$ -	\$ -	\$ 116,040	\$ 112,656	\$ 109,271	\$ 105,887
<b>Subtotal</b>	<b>\$ 29,479</b>	<b>\$ 29,479</b>	<b>\$ 120,100</b>	<b>\$ 37,000</b>	<b>\$ 153,040</b>	<b>\$ 149,656</b>	<b>\$ 146,271</b>	<b>\$ 142,887</b>
<i>Delta Previous</i>			▲ 307.4%	▼ 69.2%	▲ 313.6%	▼ 2.2%	▼ 2.3%	▼ 2.3%
<b>TOTAL EXPENSES</b>	<b>\$ 141,284</b>	<b>\$ 184,565</b>	<b>\$ 286,543</b>	<b>\$ 203,168</b>	<b>\$ 327,353</b>	<b>\$ 332,522</b>	<b>\$ 338,118</b>	<b>\$ 344,163</b>
		▲ 30.6%	▲ 55.3%	▼ 29.1%	▲ 61.1%	▲ 1.6%	▲ 1.7%	▲ 1.8%
	<i>Actual</i>	<i>Actual</i>	<i>Actual</i>	<i>Projected</i>	<i>Projected</i>	<i>Projected</i>	<i>Projected</i>	<i>Projected</i>
<b>TOTAL REVENUE</b>	\$ 122,586	\$ 211,451	\$ 248,700	\$ 253,674	\$ 261,284	\$ 271,735	\$ 282,605	\$ 293,909
<b>NON-RATE REVENUE</b>	\$ -	\$ 73,914	\$ 34,229	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000
		<i>Revenue Increase</i>	▲ 0%	▲ 2%	▲ 3%	▲ 4%	▲ 4%	▲ 4%
<b>Fund Balance (Beginning)</b>		\$ 22,982	\$ 114,073	\$ 110,458	\$ 185,964	\$ 144,895	\$ 109,108	\$ 78,595
Net Revenue	\$ 100,800	\$ (3,615)	\$ 82,506	\$ (34,070)	\$ (28,787)	\$ (23,513)	\$ (18,254)	\$ (18,254)
Capital Outlay	\$ -	\$ -	\$ (7,000)	\$ (7,000)	\$ (7,000)	\$ (7,000)	\$ (7,000)	\$ (7,000)
<b>Fund Balance (End)</b>		\$ 123,782	\$ 110,458	\$ 185,964	\$ 144,895	\$ 109,108	\$ 78,595	\$ 53,340
(as % OpEx)		80%	66%	112%	83%	60%	41%	27%
Days of OpEx as Enterprise Reserve		244.8	140.7	408.5	303.4	217.8	149.5	96.7
Months of OpEx as Enterprise Reserve		8.2	4.7	13.6	10.1	7.3	5.0	3.2

**Capital Improvement Planner**

ID	System	Scope	Description	Funding source	Interest Rate	Estimated Cost	Cost Year	Escalated Cost	Start Year	Term
1	Source	Eng.+Const.	Capital Improvement Projects	Debt	7.0%	\$ 829,000	2025	\$ 967,000	2027	20
2	Distribution	Eng.+Const.	Annual Water Main Replacement	Rate	--	\$ 67,000	2025	\$ 157,000	2036	20
3	Enterprise	Eng.+Const.	Water Enterprise On-Call GIS Water Department	Rate	--	\$ 4,000	2025	\$ 5,000	2026	20
4	Enterprise	Eng.+Const.	Water Enterprise GIS Yearly Subscription	Rate	--	\$ 1,000	2025	\$ 2,000	2026	20
<b>Total</b>						<b>\$ 901,000</b>		<b>\$ 1,131,000</b>		

