Water System Ten-Year Capital Improvement Plan (2024-2034)

December 2024

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1.0 Introduction

Housatonic Water Works Company (Company) is committed to protecting public health and the environment. This ten-year Capital Improvement Plan (CPI) outlines strategic infrastructure, technology, and services investments to support sustainable resource management and regulatory compliance. This CPI provides a working document intended to (1) convey an understanding of the Company's system and (2) the Company's prioritized needs over the next ten years.

The data contains information from Company personnel and files, including the Company's Master Plan and consultations with its engineers.

Goals:

- Provide safe and high-quality drinking water
- Minimize interruptions to the delivery of water
- Operate cost-effectively using green technologies when practical
- Consider other community goals in operating the water utility
- Provide informative and responsive customer service
- Foster communication and coordination among other local water utilities

2.0 System Overview

2.1 History:

The Housatonic Water Works Company was incorporated under Chapter 229 of the Acts of 1897. It supplies water to most of the Housatonic, located within the northern portion of Great Barrington. The Company serves approximately 1,300 residents in the village of Housatonic and smaller portions of Great Barrington, Stockbridge, and West Stockbridge.

2.2 Source:

Long Pond is situated southwest of the village of Housatonic at the foot of Tom Ball Mountain. The pond has a surface area of about 115 acres. Long Pond is spring-fed and also water from snow melt, surface runoff, precipitation, and likely bottom springs. The computed drainage area upstream of the pond outlet is approximately 563 acres.

The outlet from Long Pond is a spillway that discharges into Long Pond Brook, and eventually into the Green River. Long Pond and a good percentage of its tributary drainage area are located within the municipal boundaries of the Town of Great Barrington and its water quality protection district.

Long Pond is a natural pond except for the southernmost section of the source (approximately 6 acres), which was excavated to construct an earthen dam and spillway to control the discharge from the pond. This man-made section is approximately 2 to 5 feet deep and contains one of two intake pipes for the filter plant. One of the intakes is approximately 100 feet from the shore, while the second is located on the eastern side of the pond about 800 feet north of the dam. Each intake is an 8-inch pipe that is screened at the open end. Both intakes have manifolds outside the treatment plant. The lowest intake is approximately 9 feet below the spillway elevation. The

Housatonic Water Works Company owns approximately 35 acres on the pond's east, west, and south sides. The Town has a watershed protection bylaw to help protect the resource.

The Company owns the dam and is responsible for its maintenance and inspection. It also possesses water rights to Long Pond and has a right-of-way to the pond through all abutting lands for Company purposes.

Based on the measurement of the difference in elevation between the lower of the two system intake pipes and the elevation of the dam's spillway, the usable storage of Long Pond was computed to be approximately 263 million gallons. The amount of usable water in storage per square mile of drainage area with a full reservoir is about 299 million gallons. Although calculations made as far back as 1939 indicate that its yield is likely significantly higher, and the basis of the safe yield is not known since much of the inflow to the pond is groundwater seepage, which is not readily measured, the safe yield of the Long Pond source is 600,000 gallons per day.

2.3 Watershed Protection:

Source protection is essential for maintaining and managing quality drinking water. The Company has taken actions, including developing a protection plan to minimize threats to our supply. Great Barrington has also created a water quality protection district to protect all water supplies within the Town.

2.4 Dam:

The present dam at Long Pond was constructed to enlarge the previous reservoir. Reportedly, the “new dam” replaced an existing but deteriorated structure located approximately 800 feet upstream of the existing dam.

The dam has an earthen embankment approximately 201 feet long and 16 feet high with a concrete core. This reflects about 190 feet of embankment plus 11 feet of spillway. An 8-inch dam and gate valve are located approximately in the dam's center. Intakes for the filtration system are located along the left abutment contact. The downstream face is benched and extends about 60 feet from the dam's crest. The dam's crest is about 2.5 feet above the concrete sill of the spillway and varies in width from 13 feet to 15 feet.

The Company’s 2020 Long Pond Dam Report classified the structure as SATISFACTORY. (Scale: Satisfactory, Fair, Conditionally Poor, Unsatisfactory.)

2.5 Treatment:

The Company uses a simple, slow sand filtration system. Water from the reservoir is passed through a bed of fine sand slowly (hence, its name) compared to more mechanical, chemical-dependent methods. Natural, biological processes are relied upon to remove impurities and disease-causing bacteria. The Company can use slow sand filtration because its water source is nearly pristine. Regular monitoring of the watershed is conducted to ensure that activities in the watershed do not impair water quality. The slow sand filtration facility was constructed in 1939. Modifications to the plant (installation of Chlorine contact basin, piping and instrumentation changes, and construction of 1.0 MG storage tank) were made in 1997.

Normally, water flows by gravity from Long Pond to the filters. The difference in head, however, is minimal. When the pond level drops and/or the filters require maintenance and the water level above the sand rises, a small lift pump is used to increase flow to the filters. There are two pumps, although only one pump is operated at a time, with one pump acting as a stand-by. Each pump is equipped with a 5-horsepower motor.

Depending on demand, the filters are operated off the contact basin water level and may not operate 24 hours per day. Regular operation is to run the plant with both filters in use, except when one unit is offline for cleaning. Each filter is 48 feet wide by 48 feet long, with 2,300 square feet of surface area each. The depth of sand is 36 inches installed over 12 inches of support gravel. Typically, the filters are cleaned every 6 to 8 weeks, based primarily on the metered flow rate through the filter. Before cleaning, the filter is isolated, and the water level is drained to just below the sand level. Rather than scraping the top of the sand and removing it, as is typically done with slow sand filters, a form of wet harrowing is employed to clean the sand. A specially designed rake with jet nozzles is connected to a high-pressure water line. The rake is then scraped over the top of the sand, with the pressure wash forcing the accumulated dirt to free itself from the sand and to be flushed out with the water. An ejector pump delivers the effluent from the filters to a swale behind the building. The cleaning operation usually takes one hour per filter, and no ripening period is needed, as not all organics are removed.

Filtered water flows by gravity to a two-cell, baffled contact basin located east of the filters. The Company utilizes a two-stage chlorination process. Stage One: Just before exiting the pump house building, the filtered water is disinfected by injecting sodium hypochlorite into the common header pipe as it enters the contact basin. The dimensions of each cell of the contact basin are 46 feet by 15 feet for a total capacity of 125,000 gallons at the overflow elevation. Each cell has an identical configuration. A 39-foot-long baffle wall is installed in each compartment, from floor to ceiling, creating a 7-foot-wide channel. The filtered water pipe enters the contact basin 4 feet above the finished floor elevation. Six (6) feet from the inlet pipe is a portal wall with 2-inch diameter holes drilled approximately 2 feet on center to a height of 6 feet. An identical portal wall is installed at the end of the other channel, located 6 feet from the end of the channel. The outlet pipe is installed 2 feet above the finished floor. There is no chemical addition for corrosion control. All piping that identifies the direction of flow, raw water, filtered water, and finished water has been marked within the pumphouse.

Treated water flows by gravity back to the operations building, where the high lift pumps discharge the treated water to the 1.0 MG storage tank installed to the east end above Long Pond. Water will flow from the high lift pumps to the tank, and second-stage chlorination is added at the point of entry (POE) to the distribution system. The two pumps (one 20 horsepower and one 25 horsepower) operate in duty/stand-by mode and are controlled by the level in the storage tank.

The storage tank has both high and low-level alarms. There is a continuous turbidity monitor for the combined contact basin discharge pipe, and a Hach Cl17 in-line chlorine analyzer records the chlorine concentration leaving the CT basin. The high chlorine alarm set point is 0.75 mg/L with the low alarm set at 0.25 mg/L. There is no emergency generator for electricity for pumps; however, there is emergency backup for the chlorinator. In the event of a power failure, there is no flow from the plant; all flow will come from the 1.0 MG storage tank only. Based on the average flow to the distribution of 100,000 gallons per day, calculating approximately 10 days of water storage at an average daily flow.

2.6 Storage:

Housatonic Water Works has a 1.0-million-gallon pre-stressed concrete storage tank located approximately 650 feet northeast of the filter plant. The tank is circular and measures 40 feet in height and 65 ½ feet in diameter. It has an operating range of 10 feet (high lift pumps on at 30 feet and off at 40 feet). The tank design incorporates flow equalization and fire flow.

2.7 Distribution:

The Company's distribution system, comprised of 89,087 feet of pipe, serves the Housatonic Village of Great Barrington (759 services), as well as facilities in Stockbridge (23 services) and West Stockbridge (66 services).

Approximately 15,657 feet of pipe, or ~18% of the distribution system, has been upgraded; however, most piping is over 100 years old.

3.0 Asset Management:

Sustainably managing infrastructure is vital to the Company. While the Company has made significant investments in treatment and storage capabilities and replaced numerous transmission lines, approximately 82% of its distribution system is over 50 years old, with substantial sections of its main transmission line from Long Pond to the village center over 100 years old.

The American Water Works Association defines asset management planning as "an integrated set of processes to minimize lifecycle cost of infrastructure assets, at an acceptable level of risk while continuously delivering established levels of service." Asset management planning incorporates financial, engineering, and management disciplines to analyze asset performance and make provisions for cost-effective ways to maintain, repair, or replace assets.

Benefits of asset management include, but are not limited to, the following:

- *Greater ability to plan and pay for future repairs and replacements.*
- *Increased knowledge of assets*
- *Increased knowledge of which assets are critical to the Company and which assets are not*
- *More efficient operation*
- *Better communication with customers*
- *Increased acceptance of rates*
- *Capital improvement projects that meet the actual needs of the system*

The Company has an inventory of assets and identified critical assets based on age, condition assessment, failure history, historical knowledge, personnel experiences with that type of asset in general, and knowledge regarding how that type of asset is likely to fail. As funding allows, the company plans to acquire new field data, conduct engineering reviews, conduct computer modeling, etc.

Not all assets are equally important to the Company's operations. Some are highly critical, and others are not critical at all.

Two questions are important in determining criticality. The first is how likely it is that the asset will fail, and the second is what the consequence of failure is. This determination allows the Company to manage its risk and assist in prioritizing asset replacements.

Several factors are involved, including the age and condition of the asset, its failure history, historical knowledge, experiences with that type of asset in general, maintenance records, and knowledge regarding how that type of asset is likely to fail and require replacement.

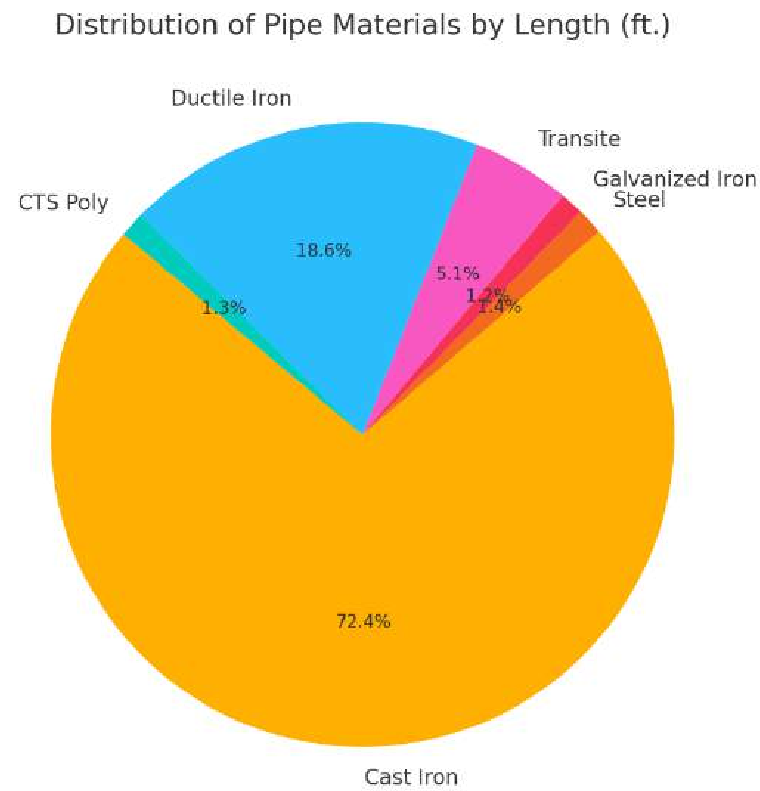
3.1 Critical Assets:

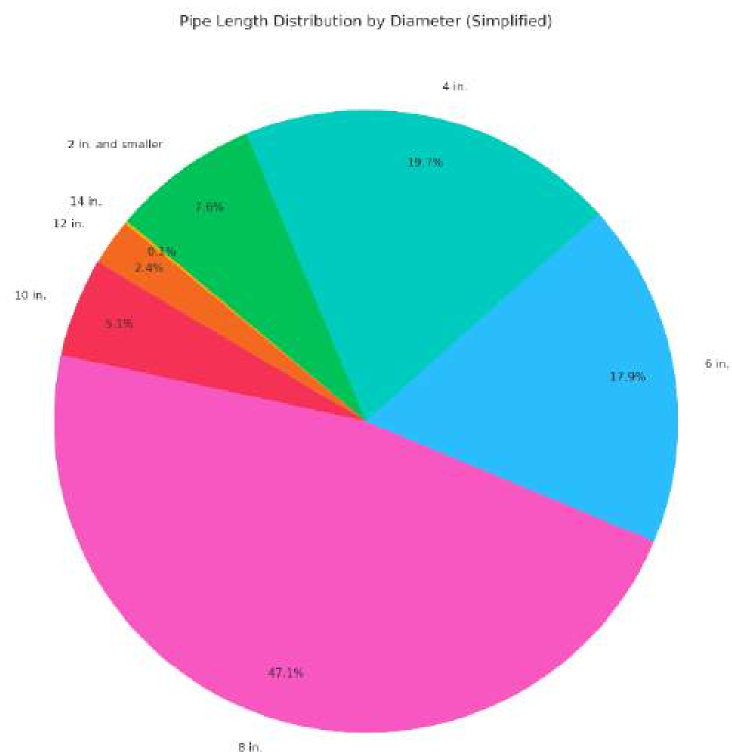
The Company has identified its source, Long Pond, Pump House, Filter Galleries, C. T Basin, 1.0 MG Storage Tank, and distribution system as critical assets.

Long Pond has an adequate source of water to supply the current and anticipated population projections. The Company continues to prioritize watershed protection.

Similarly, the distribution system has sufficient capacity to meet domestic, commercial, and fire flow demands. A 2022 Hydraulic study recommended upgrades included in this report.

The pump house and filter galleries (1930s), C. T Basin, and 1.0 MG Storage tank (1990s) structures are in good condition. The sand in the filter galleries will need to be replaced during the next 10-15 years. Upgrades to piping within the pump house have been made over the years, and the pump house remains functional. However, plans for sanitary facilities, upgraded chlorine storage facilities, decontamination areas, and safety apparatuses such as eyewash stations are planned in 2025-2026. A new master meter reader and monitoring equipment was installed in 2015. Plans for upgrading pump telemetry and the computerized S.C.A.D.A. system are also planned for that project.


Distribution of Pipe Materials by Length (ft.)
Ductile Iron
Transite
Galvanized Iron
Steel
CTS Poly
18.6%
5.1%
1.2%
1.4%
1.3%
72.4%
Cast Iron


Pipe Length Distribution by Diameter (Simplified)
4 in.
2 in. and smaller
14 in.
12 in.
10 in.
19.7%
7.6%
0.1%
2.4%
5.1%
17.9%
6 in.
47.1%
8 in.

3.2 Inventory:

Inventory of pipes, gates and valves, meters, and pumps is detailed below:

Inventory

Pipe:			
Diameter of Pipe (in.)	Kind of Pipe	Beginning of Year (ft.)	Close of Year (ft.)
14	Cast Iron	125	125
12	Cast Iron	2046	2046
10	Cast Iron	4323	4323
8	Cast Iron	29182	29182
6	Cast Iron	8464	8464
4	Cast Iron	16596	16596
2	Cast Iron	3761	3761
2	Steel	579	579
1.5	Steel	69	69
1	Steel	587	587
2	Galvanized Iron	357	357
2.5	Galvanized Iron	450	450
1.5	Galvanized Iron	200	200
0.75	Galvanized Iron	84	84
6	Transite	4205	4205
8	Transite	347	347
8	Ductile Iron	10,213	10,213
6	Ductile Iron	2411	2411
12	Ductile Iron	3904	3904
2	CTS Poly	918	918
1	CTS Poly	266	266
	TOTAL	89087	89087

Gates & Valves:		
Diameter	Beginning of year	Close of year
14	1	1
12	11	11
10	2	2
1	43	43
6	42	42
4	27	27
2.5	1	1
2	28	28
1	59	59
1.5	3	3
1.25	2	2
0.75	1014	1014
8	12	12
TOTAL	1245	1245

Hydrant-publics:	
62	>250 gpm
5	< 250 gpm
Hydrant-private: 5	< 250 gpm

Pumps:	
1	20 HP meter
3	10 HP meter
2	5 HP meter

Meters:				
Size Inches	Active Start	OHI Start	Active End	OHI End

0.625	0	36	0	36
0.75	785	29	785	29
1	3	1	3	1
1.5	5	0	5	0
2	2		1	1
TOTALS	795	67	795	67

Spare parts inventory:		
Quantity	**Size**	**Description**
15	feet	4"
340	feet	6"
370	feet	8"
43	feet	12"
102	3/4"	K Copper water lines
1	3/4"x60	K Copper coil
1	4	BCI Companion flange
13	10"	Clamps
2	12"	Clamps
10	1 5/16"	Ideal SS Pipe Clamp
3	6 x 15	Stainless Clamps
1	8 x 12	Stainless Clamps
10	used	Hydrants
2	1"	IPS Apollo Ball Valve
38	3/4"	Meter Readers
38	3/4"	Meter Readers
10	3/4"	Meter Readers? (3/4 mip x 3/4 mip corporation)
2	2"	Meter Readers
3		Meter Readers
24	5/8"	Remotes (Readers) - Stiles

38	5/8" x 3/4"	Bronze Meters
12	5/8"	Meters
21	5/8"	Meters
24	5/8"	Meters - Stiles
12	5/8"	Meters & Remotes - Stiles
20	3/4"	Meters
6	3/4"	Meters
2	2"	Meters
1	1"	Meters
36	1/2"	Meter Couplings - Short
56	5/8"	Meter Couplings
77	3/4"	Meter Couplings
30	3/4"	Meter Couplings? (3/4 mtr x 3/4 mip n/s mtr cpl)
1	2	MIP x MIP Ball Corp.
2		Moen CP Moenflo H.A.F.
3		Mueller Hydrants
1	4"	Mechanical Joints
1	8"	Mechanical Joints
1	6"	Mechanical Joints
2	12"	Valves
2	10"	cast iron bell clamps
2	8"	cast iron bell clamps

3.3 Distribution System Piping Condition

Despite their age, the Company's pipes generally appear in relatively good condition. That's not necessarily surprising, as there are many factors other than age that impact pipeline condition and breaks, including climate and soil conditions, corrosiveness of the internal and external environment, pipe type and thickness, external overburden pressures, water pressure, freezing and thawing, movement of soil around the pipes, and much more. The periodic episodes of yellow to brown-colored water are caused by manganese spikes in the Long Pond water, not by aged and rusting iron pipes. Examining pipe interiors (samples from breaks) has also shown relatively clean pipes mostly free of tuberculation. The rates of breaks and the amount of unaccounted-for water are both low, suggesting a relatively sound piping infrastructure.

While some pipe breaks are inevitable, a high rate of breaks can indicate failing pipe materials. The average annual rate of pipeline breaks is quite low, at 0.022 per mile per year (3 breaks over the past 6.67 years with 17 miles of mains). That is significantly better than the goal for a fully optimized system of 0.15 per mile per year (per the AWWA Partnership for Safe Water Distribution System Optimization Program), and much lower than the national average of about 0.25 per mile. The amount of unaccounted-for water, partly influenced by pipe leaks, is also low, at less than five percent (less than 10% is considered good). A significant improvement was made with the identification and subsequent repair of a substantial leak in December 2019, and the average flow went down by about 34 percent from ~157,000 gallons per day to ~103,000 gpd.

The Company's commitment to improving the water system infrastructure continues with its long-term pipe replacement program. To help prioritize fire flow needs, a field hydraulic study was conducted in 2022 to identify current conditions by measuring hydrant flows and pressure. HWWC will work with the Great Barrington Fire District to identify flow needs and will identify critical flow control points (restrictive bottlenecks). Financial investments can be made efficiently by prioritizing improvements that the data indicate are needed. The data can also be used to calibrate a hydraulic model, which can then be used to estimate increases in flow rates based on different pipe replacement strategies. Pipe condition assessments (e.g., CCTV) could be used to help identify whether specific pipes need to be replaced or not. If needed, pipe cleaning methods could improve flow rates and remove legacy manganese. The current Capital Improvement Plan already includes installing a new second pipeline from the water treatment plant to provide redundancy, and that will increase volume.

3.4 Meters:

The Company had a new master meter installed in 2015. Overall, 98% of residential, industrial, commercial, and institutional customers have meters to track consumption. Most residential, commercial, and institutional meters were replaced in 2018.

3.5 Service lines

Addressing aging service lines is essential to ensuring safe and reliable water. Although the Company does not own any portion of the customer's service lines, it completed a service line inventory and monitors options to assist customers in funding replacements. Potential funding sources include federal and state grants and public health initiatives. By implementing strategic replacement initiatives, the Company aims to help eliminate lead-related risks and enhance the overall quality of the water supply for all customers.

The town's Master Plan identifies significant redevelopment strategies, including redeveloping the mills into mixed-use residential/ commercial space and revitalizing the former Housatonic School. The actual renovation of the school into housing and the construction of twenty new homes on Prosperity Way began in 2024.

The Company's registered withdrawal Volume is 270,000 gpd and source safe yield of 600,000 gpd. Daily numbers averaged 203,556 gpd from 2010-14, according to the Company's Annual Statistical Report Data on file with the Commonwealth of Massachusetts Department of Environmental Protection (MADEP). Under the Water Management Act, a system can withdraw an additional 100,000 gpd over the registered amount before filing for a permit.

3.6 Resiliency:

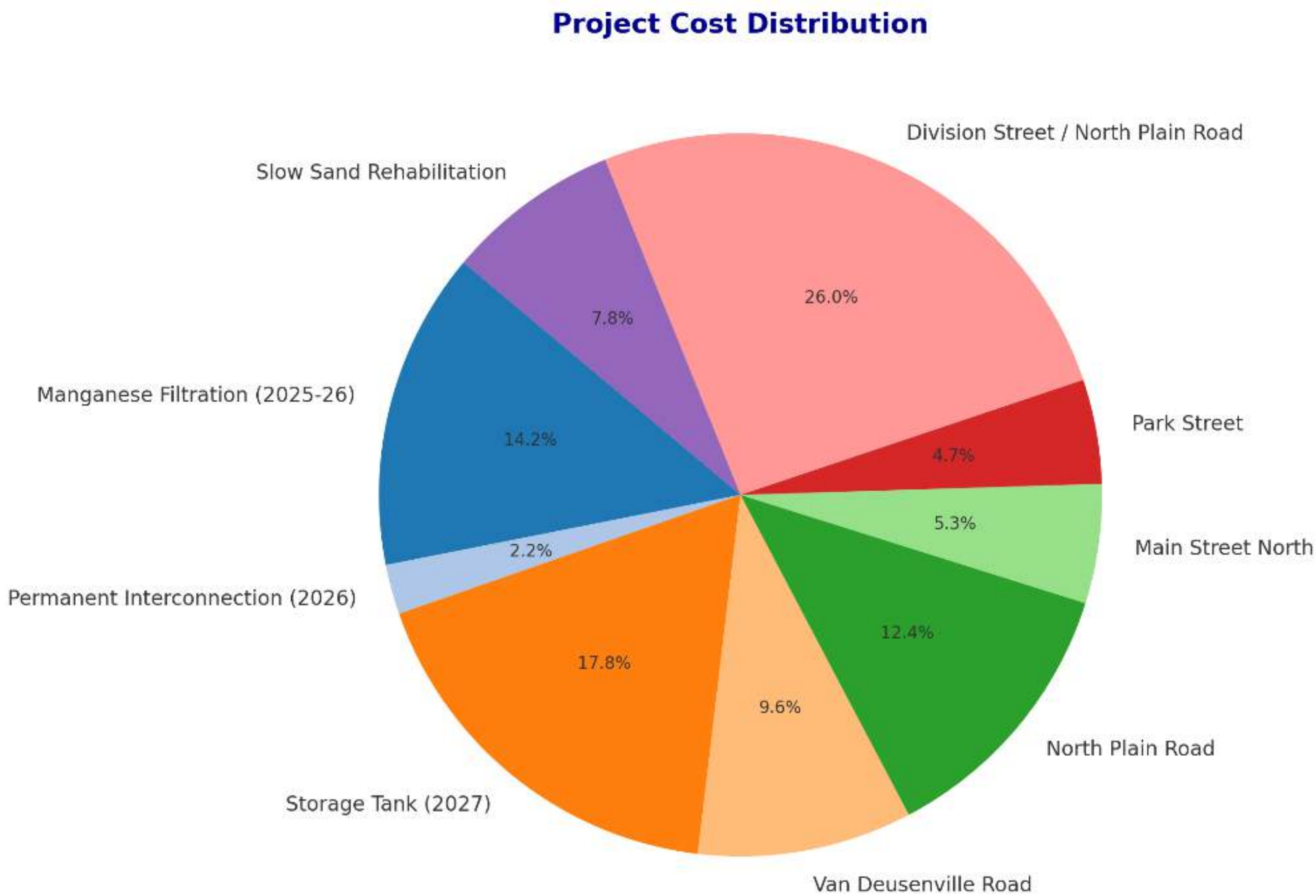
Currently, the Company relies primarily on a temporary interconnection with the Great Barrington Fire District (GBFD) for emergency water supply, which requires a hydrant-to-hydrant hook-up. To enhance system resiliency, the company plans to establish a permanent interconnection with the GBFD in 2026.

4.0 10-year Capital Improvement Plan

4.1 Overview

The Company's planned improvements address seasonal Manganese, resiliency, and aging infrastructure. By remediating seasonal manganese issues through proven treatment solutions and upgrading water mains to enhance resiliency and fire protection, the Company is committed to ensuring a reliable, safe, and efficient water supply for its community. The Company's slow sand filters, operating since 1939 with media replacement in the 1980s, have been functioning successfully with minimal capital maintenance required. However, due to the age of both the filters and the media, the Company's long-term plans are to rehabilitate the filters within the existing filter box to ensure continued reliable water treatment and maintain the plant's operational efficiency.

These improvements address immediate concerns and lay the foundation for a resilient and sustainable water distribution system to meet future demands. The Company is also committed to incorporating green technologies and practices.


Project Cost Distribution
Division Street / North Plain Road
26.0%
Slow Sand Rehabilitation
7.8%
Manganese Filtration (2025-26)
14.2%
Park Street
4.7%
Main Street North
5.3%
Permanent Interconnection (2026)
2.2%
17.8%
9.6%
12.4%
North Plain Road
Storage Tank (2027)
Van Deusenville Road

4.2 Projects/Improvements:

Project Name	Scope	Pipe Size	Length (Feet)	Estimated Cost Range
1. Manganese Filtration (2025-26)	Construct a new building to house Green Sand Filtration equipment, install a generator, upgrade monitoring/telemetry systems, add sanitary facilities, and create a lab/office area.	N/A	N/A	**$1,600,000**
2. Permanent Interconnection (2026)	Install a permanent interconnection between the Great Barrington Fire District (GBFD) and the Company's distribution system on Christian Hill Road to enhance resiliency and water supply reliability.	N/A	N/A	**$375,000**
3. Storage Tank (2027)	Construct a 200,000-gallon elevated water storage tank on High Street to address fire flows to the village's core.	N/A	N/A	**$1,600,000**
4. Van Deusenville Road (TBD)	Replace 2,700 feet of 6" asbestos cement (AC) main with new 12" ductile iron (DI) piping.	12" DI	2,700	**$1,300,000**
5. North Plain Road (TBD)	Replace 5,600 feet of 6" cast iron (CI) main with new 8" ductile iron (DI) piping.	8" DI	5,600	**$2,250,000**
6. Main Street North (TBD)	Replace 2,400 feet of 4" and 6" cast iron (CI) main with new 8" ductile iron (DI) piping.	8" DI	2,400	**$1,000,000**
7. Park Street (TBD)	Replace 2,100 feet of 6" cast iron (CI) main with new 8" ductile iron (DI) piping on Park Street.	8" DI	2,100	**$843,000**
8. Division Street / North Plain Road (TBD)	Install 7,300 linear feet of 12" ductile iron (DI) piping between the treatment plant and North Plain Road.	12" DI	7,300	**$2,900,000**
9. Slow Sand Rehabilitation (TBD)	Replace media in existing slow sand filter boxes to ensure	N/A	N/A	**$750,000 – $1,000,000**

Total Estimated Cost for All Projects: $12,628,000 – $12,868,000

4.3 Funding Options

As a private utility, the Company relies primarily on conventional funding methods. It has maintained a longstanding partnership with Co-Bank, which has provided market-rate financing for over 30 years and has been a stable and reliable funding source.

In addition to traditional financing, the Company actively monitors opportunities for grants and low-interest loans from state and federal agencies to supplement its funding needs. In 2024, the company received a grant from the Massachusetts Department of Environmental Protection (MassDEP) for the Manganese Filtration Project, as well as grants for Service Line Inventory (SLI), lead Service Line Replacement Plan (LSLRP), and cybersecurity. These grants are crucial in mitigating the financial burden of essential infrastructure.

The Company plans to continue pursuing available grants and low-interest loans to support upcoming capital projects. This approach aims to leverage resources and expertise, thereby maximizing the impact and efficiency of funded projects.

Also, as a private utility, any financial increases to customers to cover project expenses require approval from the Commonwealth of Massachusetts Department of Public Utilities (DPU). The regulatory approval process for rate adjustments is stringent and can take a year or more. This constraint limits the Company's swift flexibility in responding to emerging financial needs. Consequently, the Company strategically plans its funding approaches.

We aim to balance conventional financing with grants and low-interest loans to secure the necessary funding for capital improvement, thereby maintaining and enhancing quality, reliability, and sustainability for the community we serve.