

Infrastructure

Infrastructure

DPW

Engineering & Admin

Streets & Sidewalks Division

Water Department

Wastewater Division

Solid Waste Department

Water

4 Wells , 2 Water Tanks

2 Treatment Facilities

47 miles of water mains

Wastewater

1 Treatment Plant

19 pumping stations

37 miles of mains

Stormwater

1,240 Catch basins

97 Outfalls

109 Culverts

Solid Waste

1 Transfer Station –
Recycling and Solid Waste

No curb side pickup

Sewage sludge removal
needs regional support

Introduction

This chapter examines Ayer's Town infrastructure and public utilities. The Town has a strong interest in continuing to provide high-quality services including water, wastewater, stormwater and solid waste. Alternative funding sources and creative partnerships need to be pursued to ensure that these services continue to meet the high standards of the community. Many of the utilities within Ayer were constructed decades ago and systematic repair and replacements are needed. Infrastructure planning will focus on upgrades, meeting existing and future regulatory requirements, sustainability and energy conservation.

The Department of Public Works actively monitors each of their systems and commences with frequent and critical studies to improve the systems and maintain regulatory compliance. DPW studies focus on the condition of the water system, both with testing for contaminants, and also to increase efficiency by installing modern water meters and perform pipe maintenance for compliance with state permits. Similarly, DPW studies their facilities need to ensure their equipment, staff, and workspaces meet the Town's needs for their provision of services. The transfer station also falls under DPW's jurisdiction. There have been attempts to bring curbside pickup to Ayer, but they have been unsuccessful. Finally, DPW performs frequent studies of Ayer's roadways and parking (discussed in the Transportation & Circulation Chapter).

Infrastructure Goals:

1. Continue to provide a safe and reliable drinking water supply to Ayer residents and businesses.
2. Maintain and protect Ayer's wastewater system to ensure that current and future development can be supported in a manner that is safe, sanitary, and protects the public health.
3. Protect the Town's water resources and reduce localized flooding through effective stormwater management practices.
4. Provide solid waste and recycling opportunities for the Town's residents minimizing waste volumes, environmental impacts and maximizing reuse and recycling.
5. Reduce the energy consumption of for Town services



Department of Public Works

The Ayer Department of Public Works (DPW) is staffed by 23 full time employees and is charged with maintaining and improving Ayer's infrastructure – streets and sidewalks, roads, trails, public water system, wastewater system, stormwater system, solid waste / recycling and municipal streetlights – and ensuring its safe, continued and efficient operation. DPW works in partnership with the residents, businesses, institutions and State agencies to provide a high level of service with great attention toward future system needs. Residents and businesses are able to connect with DPW through an online service request form, a stormwater hotline, and standard email and telephone contacts. Further, DPW routinely conducts public outreach as part of their operations to keep residents informed about upcoming work – whether the work involved is construction projects, chemical treatments to the ponds to reduce invasive species and improve pond health, or even to provide tips on how to reduce environmental impacts when caring for a lawn. While upcoming financial needs of Ayer's aging infrastructure is significant, Ayer's DPW has been proactive in studying each of its systems, and their individual components, to identify the most immediate and pressing concerns each system is facing. Further, in efforts to reduce the burden of paying for these improvements on residents, DPW consistently seeks and obtains grant funding to complete high priority studies and implement plan findings.

Maintaining the Town infrastructure requires a significant amount of vehicles, equipment and licensing.

Water



Providing a safe and reliable water supply is a highly regulated operation. Ayer's water system provides potable drinking water and fire protection to over 95% of the Town including several large food and beverage processing industries. The water supply meets all State and Federal Safe Drinking Water Regulations and is operated by the DPW Water Division.

Ayer's water supply system was started in 1896 with a supply well near Balch Pond and a water storage reservoir on Washington Street. It has expanded over the years with the addition of new water supplies, treatment plants, water tanks and distribution piping. The ground water supply system currently consists of the following facilities: for four wells – located at Spectacle Pond and Grove Pond, two treatment facilities, and two storage tanks. **The Town of Ayer's water distribution system consists of approximately 47 miles of water mains ranging in diameter from four to sixteen inches. Approximately 9 miles of pipe is over 100 years old.**

Table I-1 Ayer Water System

Facility	Capacity
Spectacle Pond Wells	2.0 mgd
Grove Pond Wells	2.7 mgd
Spectacle Pond Filtration Facility	2.8 mgd
Grove Pond Treatment Facility	N/A
Washington Street Storage Tank (1995)	1.5 mg
Pingry Hill Storage Tank (2016)	1 mg

Source: Ayer DPW, 2017

The Town of Ayer has two groundwater supply sources - the Spectacle Pond wells and Grove Pond wells. The Spectacle Pond supply source consists of two wells located in the Merrimack River Basin. The two wells at the Grove Pond site had only been used as an emergency backup source since the late 1980's due to high concentrations of iron and manganese in the groundwater. However, in 1998, the Grove

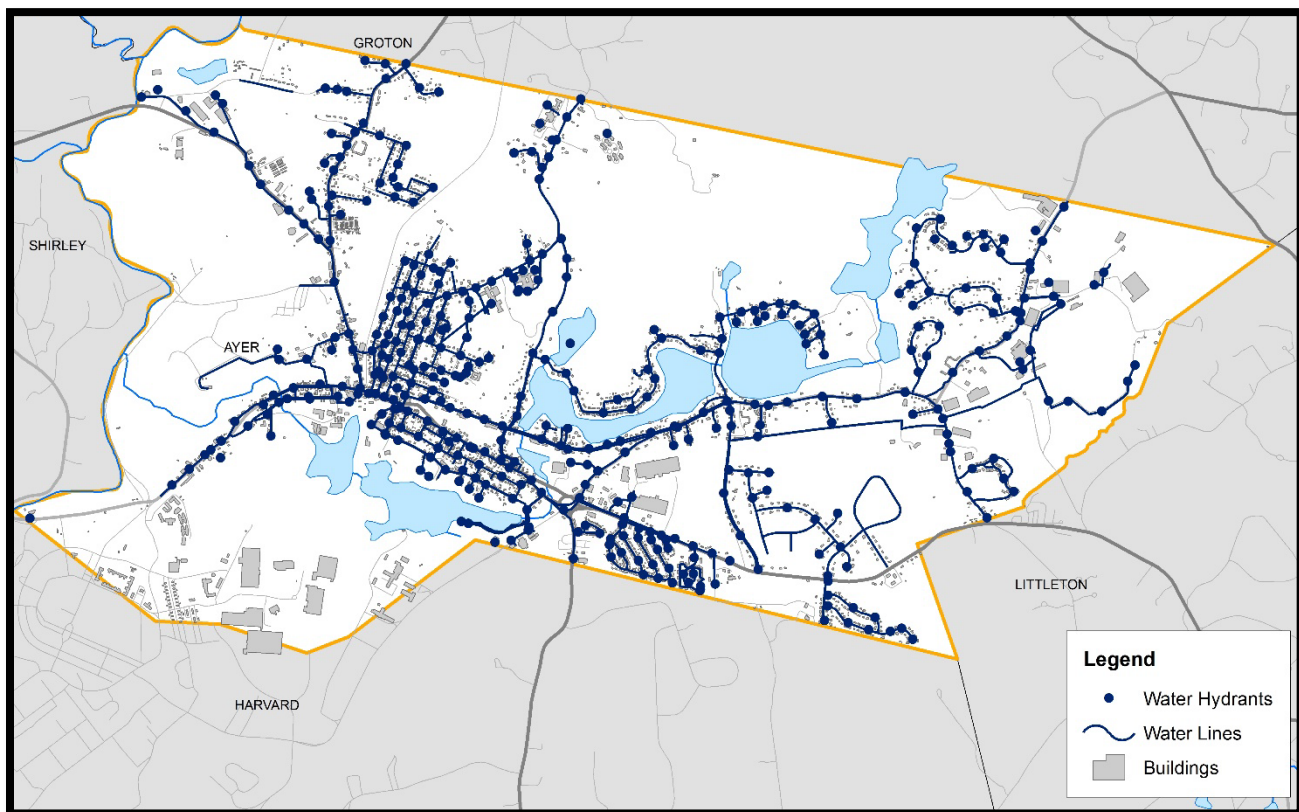
Pond wells were redeveloped and a water filtration facility constructed. These improvements have enabled the Town to utilize the Grove Pond water supply source again on a regular basis. In addition to the groundwater supply sources, the Town has three interconnections with adjoining water systems in case of emergency.

The existing Grove Pond Water Treatment Facility treats water from three water supply wells, Grove Pond Wells No. 1 and 2, with a combined yield of 2.7 mgd (million gallons per day) and a permitted maximum daily rate of 2.0 mgd. The treatment facility uses pressure greensand filters to remove iron, manganese and arsenic from the water, Potassium hydroxide and chlorine are added for corrosion control and disinfection, respectively.

The Spectacle Pond well site is located in the northeast section of the distribution system near the border of Littleton and Ayer. The site consists of two gravel packed wells. A 2.8 mgd capacity water filtration facility on site uses greensand filtration for the removal of iron, manganese, turbidity and color. Sodium hypochlorite is used to oxidize the iron and manganese and provides a chlorine residual in the finished water. The two wells have permitted average daily withdrawal volume of 1.16 MGD and a maximum daily withdrawal of 2.14 MGD.

The Town has two distribution storage tanks, one 1.5 million gallon (MG) welded steel water storage tank located on Washington Street behind the Page Hilltop Elementary School. The tank was constructed in 1995. The other tank is 1 prestressed concrete tank with a 1.0 MG capacity and is located on Pingry Hill off of Woodland Way. This tank was completed in 2016. Both tanks have an overflow elevation of 442 feet, which sets the pressure gradient for the Town.

Map I-1 - Ayer's Water System



Water Usage

The water system currently has an average day water demand of 1.45 MGD with a maximum day demand of 2.5 MGD. The per capita usage is approximately 60 GPD. Water rates are established on an annual basis by the Board of Selectmen, with a split rate system for commercial and residential users. **The commercial and industrial usage accounts for approximately 65% of the total water usage, and pay a higher rate than residential customers.** Should Ayer lose a large industrial consumer, the Town's ability to fund the long-term maintenance needs and routine operations of the water system could be severely impacted.

Ongoing Evaluations and Improvements

DPW's Water System Forecast



Planned Improvements:

- Replacement of the 1896 cast iron water main in East Main Street with a new 16-inch ductile iron water main.
- Construction of an additional well at the Grove Pond wellfield, including improvements to the water treatment facility.
- Construction of a replacement well for Spectacle Pond Well 2.
- Annual water main improvement budget of \$250,000 to replace aging water mains throughout town.
- Installing new water meters with radio transmitters throughout the Town.
- Implementing new water conservation measures.
- Constructing water main improvements to improve reliability and water pressure for the Groton School Road area, Wright Road area and an emergency interconnection with Devens on Barnum Road.

System Needs:

1. Potential need for additional treatment at Grove Pond Wellfield due to groundwater contamination from Fort Devens.
2. The water distribution system is composed of aging pipes. It is estimated that the cost to replace the 9 miles of pipes over 100 years old will be \$8.1 million.
3. Loss of a large industrial user will have a significant impact on the sewer rate structure.
4. The Town needs to identify an additional long term water supply source to meet future needs and begin the process of approving the supply.

Ayer's DPW is very active in evaluating and upgrading the Town's aging water infrastructure. In 2013, DPW developed a Water Distribution System Improvement Program to review the condition of Ayer's pipes, where over 65,000 feet of pipe was found to be in poor condition at a totally cost of \$11.4m to fix. Further, DPW monitors Ayer's water quality and issues annual reports highlighting current conditions and upcoming concerns. The long term capital needs to maintain and improve Ayer's water system are significant, as is common in any

system of its size. The needs range from the replacement of aging pipes and connections to upgrading filtration and treatment facilities to meet evolving regulatory requirements and respond to new contaminants. Ayer's DPW engages in both short term and long range planning, and operates based on a five-year Capital Improvement Program. The continued study and maintenance of Ayer's water system is integral to ensuring the public water supply is well protected.

Wastewater



The Town of Ayer owns and maintains a town-wide wastewater collection and treatment system. The system was initially constructed in 1942, serving the Main Street/Washington Street area, East Main Street Area and West Main Street Area. As the Town has grown, the sewer system has expanded to serve the majority of the Town. The operation and maintenance of the sewer system and wastewater treatment plant is performed by the Wastewater Division of the Department of Public Works (DPW).

The Town of Ayer has a large industrial and commercial presence contributing to the wastewater flows. Approximately 90% of the industries, businesses and residences in Ayer tie into the sanitary sewer system. **Non-residential sewer use accounts for approximately 54% of the total flow.** There are 3 Significant Industrial Users (SIU) who require a pre-treatment permit and dispose of some of their wastewater off-site; these users are generally involved in food and beverage manufacturing and have greater needs for managing wastewater than average users.

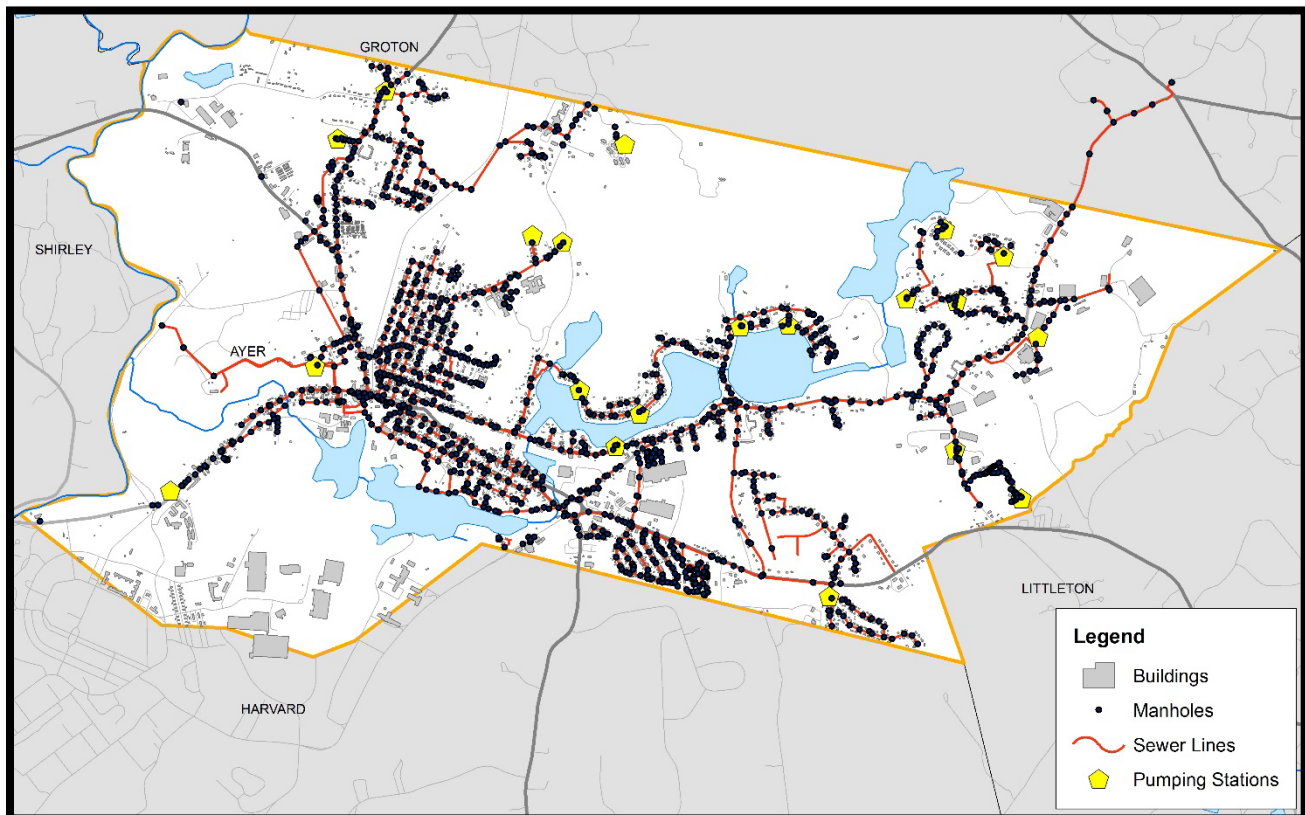
The sanitary sewer system consists of approximately 177,000 linear feet (LF) of gravity sewer. Gravity sewers are the most common type of sewer and are generally constructed wherever conditions are favorable to move wastewater from higher elevations to lower elevations. However, where this is not possible, sewer pumps and lifts are constructed to address grade and pressure issues. There are approximately 17,000 LF of force mains, and 19 pump stations. Of these pump stations, 5 are classified as primary pump stations and require daily inspections by an operator. The main pump station owned by the Town, is located just upstream of the Town's Wastewater Treatment Plant (WWTP), and is the largest station and pumps all sanitary flow in the Town to the WWTP. There are 2 pumps within the station to pump excess flows to the Devens WWTP, where the Town is contractually required to pump a minimum of 100,000 gpd, at an additional cost to the Town. **Ayer's Wastewater disposal agreement with Devens will end in 2021. The agreement is critical for both systems; Ayer needs capacity from Devens to meet state regulations.** The negotiation of a new agreement is critical to the long term wastewater capacity of the Town, but both financial and political issues will need to be addressed.

The Ayer WWTP was designed in 1978 and placed into operation in 1982. Since this date, the Town has conducted a number of upgrades to both maintain and improve operations. The first major facility improvement was the upgrade from mechanical to fine bubble aeration in 1994. This project included the construction of a blower building to house new blowers associated with the fine bubble aeration system. In 1997, the Town was issued an Administrative Consent Order with Penalties (ACOP) by the Massachusetts Department of

Environmental Protection (DEP) for noncompliance of wastewater treatment facilities. In response, the Town passed a Sewer Moratorium to preclude new development from connecting to the Town's wastewater system as upgrades were made to the system. The moratorium was lifted in 2003 following the completion of upgrades to the wastewater facilities at 25 Brook Street and the execution of the agreement with Devens to ensure sufficient capacity and redundancy to meet state regulations.

A second major upgrade was completed in 2007. In this project, a vortex grit system, a set of anoxic tanks, tertiary cloth disk filters, and UV disinfection were added, accompanied by the replacement of most process pumps including two primary sludge pumps, the primary scum pump, three return activated sludge pumps, two waste activated sludge pumps, and the secondary scum pump. In addition, former aerated grit tanks were converted to sludge storage tanks, associated sludge transfer pumps were installed, the septage handling system was reconfigured, mixed liquor recycle pumps were added to the aeration tanks, aeration blower motors were replaced, a fourth blower was added, the plant water system was replaced, and major upgrades were performed to both electrical and controls systems. Along with these large upgrade projects, smaller improvements and investigations have been undertaken throughout the past three decades. These include replacement of the UV disinfection system and an energy upgrade project.

Map I-2- Ayer's Wastewater System



Ongoing evaluations and improvements

DPW's Wastewater System Forecast



Planned Improvements:

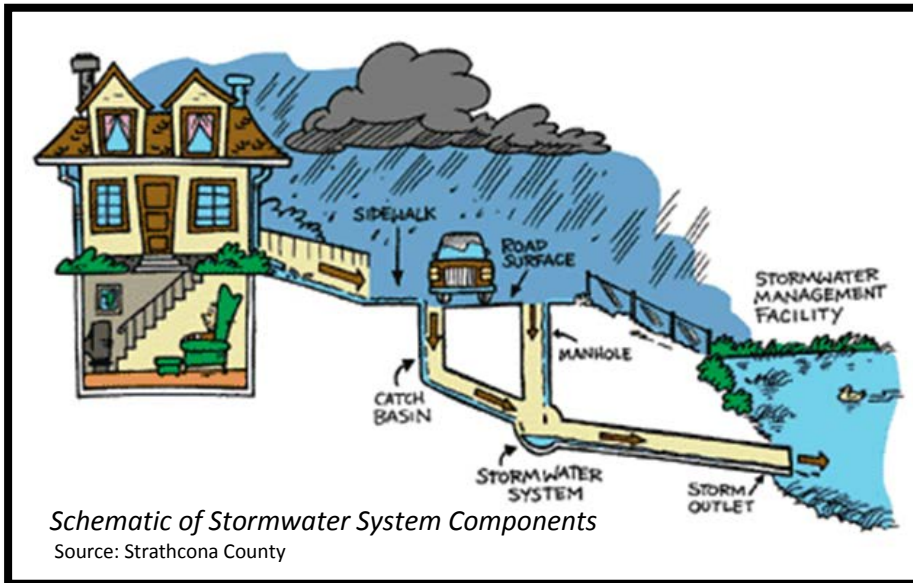
- **Wastewater Treatment Plant Evaluation and Capital Improvement Plan** – In 2015, the DPW hired engineering company CDM-Smith to perform a detailed evaluation of the wastewater treatment facility. The evaluation resulted in a multi-year capital plan that is currently being implemented
- **Inflow and Infiltration Study** – The DPW completed the initial phase of the Inflow and Infiltration study in 2016 and 2017. While this was a regulatory requirement, it was also a valuable in identifying and prioritizing the critical infrastructure repairs in the system. The next phase in the study will include detailed pipe and manhole inspections.
- **East Main Street Sewer Rehabilitation** – In 2016, the sewer in East Main Street, Faulkner Street and Tannery Street was repaired and relined. This was done in anticipation of roadway improvements to be done in 2018.
- **Pleasant Street Sewer Rehabilitation** – The sewer in Pleasant Street was repaired and relined in 2016 as the road was being repaved.
- **Sewer System Operations and Maintenance Plan** – The Ayer DPW developed an operations and maintenance plan for the sewer collection system in 2016.

System Needs:

1. Wastewater Treatment Plant is aging and in need of facility upgrades to:
 - a. Extend the useful life of the facility
 - b. Meet current health, safety and building codes
 - c. Meet NPDES discharge permit requirements
 - d. Improve operational efficiency
2. Wastewater sludge disposal is costly, energy intensive (trucking, incineration) and unreliable. A long term regional solution is required.
3. The collection system has significant inflow and infiltration and the Town has begun a program to identify the locations of the leaks. Correcting this will require a major annual expense in order to make incremental improvements to the system.
4. Ayer's Wastewater disposal agreement with Deven will end in 2021. The renegotiation of a new agreement is critical to the long term wastewater capacity of the Town.
5. Loss of a large industrial user will have a significant impact on the sewer rate structure. With more than half of wastewater flows being generated by non-residential users, a loss of a major user will fundamentally alter Ayer's funding capabilities for future capital improvements.

The Ayer DPW has been proactive in evaluating and maintaining the Town's wastewater system and has completed several key studies in recent years to determine the adequacy of Ayer's sewer infrastructure and wastewater treatment facilities and prioritize improvements. Improvements to wastewater operations includes investing in new technologies for water treatment and filtration, replacement of mains and pump stations, communications upgrades for monitoring wastewater systems, identifying sources for inflow and infiltration, and other activities.

Stormwater



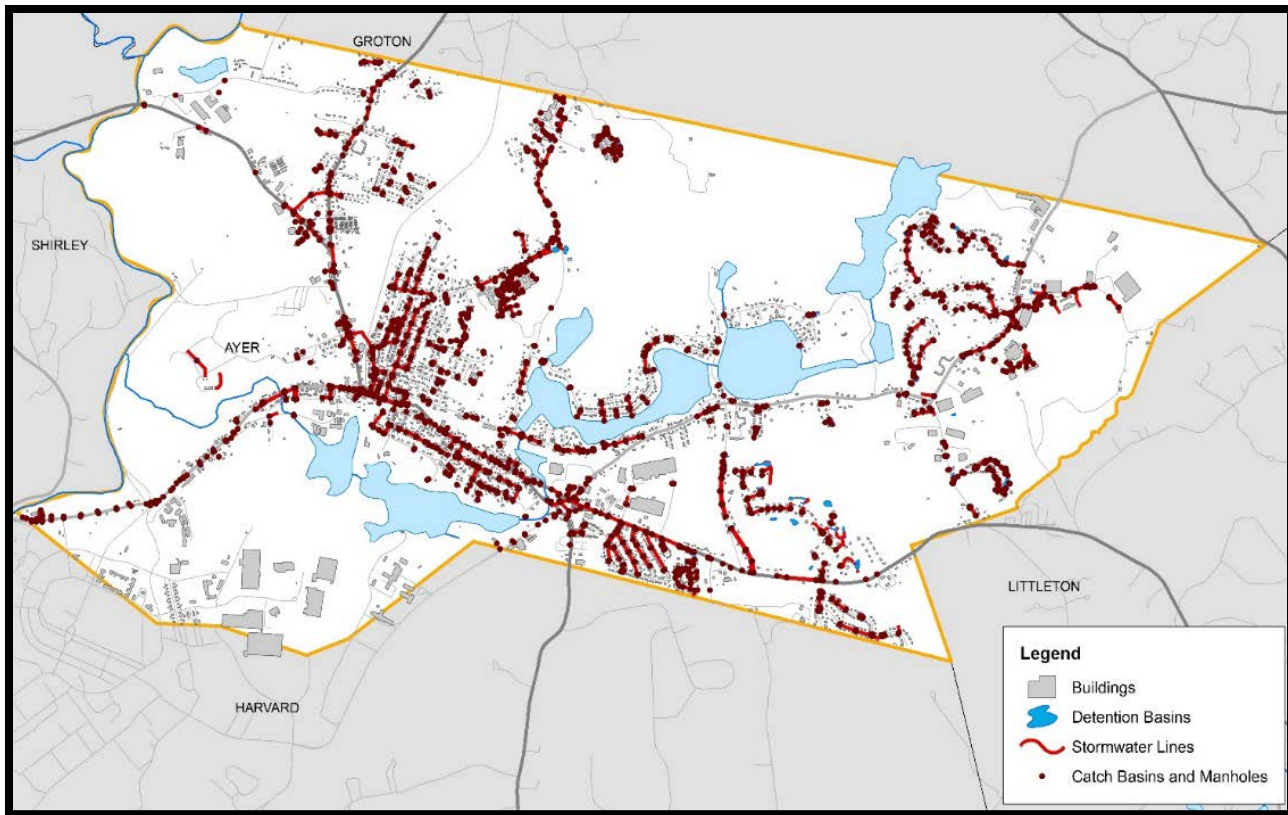
Construction on Ayer's stormwater system was constructed primarily during the 1960s. The current system consists of miles of stormwater mains, 1,240 catch basins, 400 manholes, 109 culverts, 3 detention areas, and 97 stormwater outfalls.¹ Stormwater systems work by collecting run off, which is water from precipitation like rain and snow, but also from sprinklers and hoses, that collects on impervious surfaces

(paved roads and parking areas, sidewalks, roofs, etc.) and travels into the stormwater system via catch basins and manholes. As the stormwater runoff moves along during a weather event, the water collects trash, fertilizer, pesticides, motor oil, heavy metals, and other pollutants. This water can then be absorbed back into the ground and waterways, having a significant impact on water quality, including the public drinking water supply, as well as natural environments, water resources, and wildlife.

¹ Ayer Geographic Information System attribute data, 2017.

Map I-8: Ayer's Stormwater System

The National Pollutant



Discharge Elimination program has been in operation through the US Department of Environmental Protection since 1990 to regulate stormwater discharge and protect water quality. The program requires that Ayer obtain an MS4 permit to operate the stormwater system. The MS4 permit authorizes the discharge of stormwater from small municipal separate storm sewer systems that are located entirely or partially within an urbanized area, the Town's most recent MS4 permit was issued on July 1, 2017. As part of the permit, DPW is required to submit a Notice of Intent, Stormwater Management Plan, inventory all sanitary sewer outfalls, rank outfalls and catchment areas for illicit discharge detection elimination, identify illicit connections, inspect and enforce erosion control measures, perform more frequent street sweeping and catch basin inspections, and perform public outreach and education on issues such as lawn care, improper waste handling, and other issues. DPW has made great strides in mapping the system, monitoring for illicit discharges, inspections, water quality monitoring, street sweeping, and notably, the installation of Best Management Practices in three locations: Pirone Park Rain Garden, Oak Ridge Drive Hydodynamic Separator, and a bioswale.

However, continued compliance will be expensive. Ayer hopes to pay for some of its stormwater requirements through matching grants that the Town has applied for, but at current, maintenance of the stormwater system is funded through the Town's General Fund. An attempt was made in the 1990s to create a stormwater utility, but the measure failed at the Board of Selectmen and no long term funding mechanism has been established to address long term system needs.

Ongoing Evaluations and Improvements

Ayer's DPW has been working toward creating an effective stormwater system:

DPW's Stormwater System Forecast



Planned Improvements:

- Annual Education Materials
- Catchment Investigation Plan and Dry Weather Screening
- New Stormwater Management Bylaw & Site Plan standards
- Source reduction plans for impaired waters
- Planning and implementation of Total Maximum Daily Load allocation
- Maintenance/Inspection Plan for Stormwater Facilities
- Develop Stormwater Pollution Prevention Plan

System Needs:

1. Implementation of the MS4 permit is anticipated to require a 20% budget increase on average. There is currently no dedicated funding mechanism to pay for Ayer's stormwater system needs.
2. A Permitting and inspections management system needs to be established to track DPW's efforts.
3. Enhance Best Management Practices (BMPs) through the installation of "green" stormwater management facilities.

Formative Issues

Assets and Opportunities	Challenges and Weaknesses
<ul style="list-style-type: none"> • DPW – Ayer’s single greatest asset with respect to Infrastructure is the Department of Public Works employees. Ayer’s dedicated workforce of Town employees ensure that the Town is well maintained and that the complex issues facing each major system are not disregarded and ignored because they are difficult issues to resolve. Ayer’s talented staff manages to stretch every penny and leverage every opportunity to make improvements for the safety and public health of Ayer, with minimal impacts to the residential tax burden. • Customer Base – Ayer has a varied customer base including industrial users and residential customers. However, much of Ayer’s water and sewerage price policy is based on assumptions regarding large industrial users. Without industrial users, the current pricing system will no longer be sustainable thereby impacting residential customers. • Stormwater Utility – Although it is not a current priority of DPW, the successor to the current director should revisit the creation of a stormwater utility to help offset maintenance costs and improvements to the stormwater system. With increased concerns regarding storms, inland flooding, and other impacts of climate change, getting ahead of stormwater issues will be essential in upcoming years. 	<ul style="list-style-type: none"> • Funding – Funding remains the most significant challenge facing Ayer’s DPW. The needs of the stormwater, wastewater, and water systems and facilities are extensive, and expensive to address. While water and wastewater are operated as utilities and user fees are levied to help support those systems, there is no provision in place to address the stormwater system, which keeps the Town from flooding and discharging pollutants into the groundwater supply. Long term funding solutions is absolutely critical to Ayer’s ability to support its residential and business community. • Pollutants and Impaired Waters – Ayer’s industrial legacy will have long ranging impacts on Ayer’s water quality and stormwater management needs. Contaminants from recent industrial accidents and past industrial negligence will require that Ayer remain vigilant in protecting its water resources. • Systems Capacity – Ayer’s water, wastewater, and stormwater systems are regulated by the Department of Environmental Protection. Meeting their standards for capacity, redundancy, and emergency conditions will continue to be a challenge for Ayer. Regulatory changes typically result in unfunded mandates that require Ayer to find their own funding sources to offset increased costs with increasingly less assistance from state and federal government sources.

Recommendations:

- Implement stormwater utility to offset general fund costs for the purposes of basic maintenance.
- Explore new opportunities to construct wellheads on uncontaminated aquifers to ensure Ayer’s long-term access to potable water.
- Continue to fund the replacement and maintenance of sewer and water lines to prevent exfiltration and infiltration of sewage and water.
- Continue to perform long range planning, particularly for capital needs such as equipment and facilities, to ensure long term compliance with state regulations.
- Find regional solution for sludge treatment to reduce solid waste costs.