



Parmenter Brook

Watershed Description

This **TMDL** applies to the Parmenter Brook assessment unit (RI0008039R-37), a 5-mile long stream located in Hopkinton, RI (Figure 1). The Town of Hopkinton is located in the southwestern corner of the state and is bordered by Connecticut to the east and Westerly, RI to the south. Parmenter Brook is located in the southwestern section of town along the Connecticut border. The Parmenter Brook watershed is presented in Figure 2 with land uses indicated.

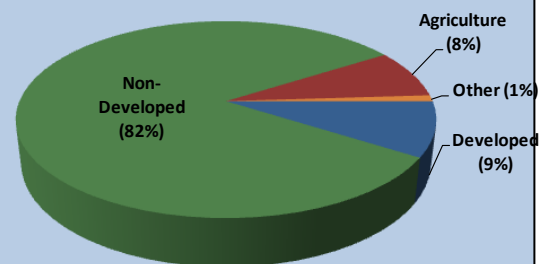
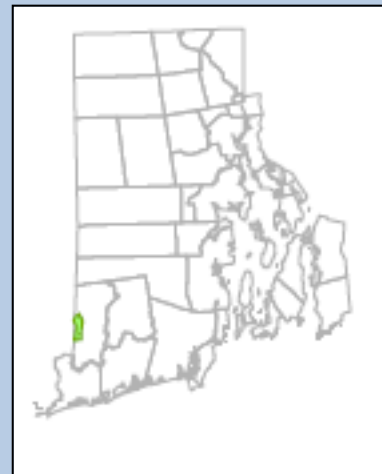
The two branches of Parmenter Brook begin in a forested area in western Hopkinton, flow southerly, and join north of Woodville Road. The brook continues south through an agricultural area and crosses Woodville Road. Parmenter Brook flows parallel to Route 3 through a low-density residential area, and joins with the Green Fall River to form the Ashaway River, another bacteria-impaired river, on the Connecticut border just north of Interstate 95 (I-95).

The Parmenter Brook watershed covers 2.5 square miles. Non-developed areas occupy most (82%) of the watershed. Developed uses (including residential and commercial uses) occupy approximately 9%, and are characterized by low-density residential development. Agricultural land uses occupy 8% and other land uses combine to occupy 1%.

The Town of Hopkinton is 44 square miles and has a population of approximately 8,000 people. Hopkinton has over 1,000 acres of open space supporting various recreational activities. The Hopkinton Land Trust was established in 2004 and has protected 875 acres of land through property acquisition and conservation easements (Town of Hopkinton, 2010).

Assessment Unit Facts **(RI0008039R-37)**

- **Town:** Hopkinton
- **Impaired Segment Length:** 5 miles
- **Classification:** Class A
- **Direct Watershed:** 2.5 mi² (1579 acres)
- **Impervious Cover:** 3.3%
- **Watershed Planning Area:** Wood – Pawcatuck (#23)



Watershed Land Uses

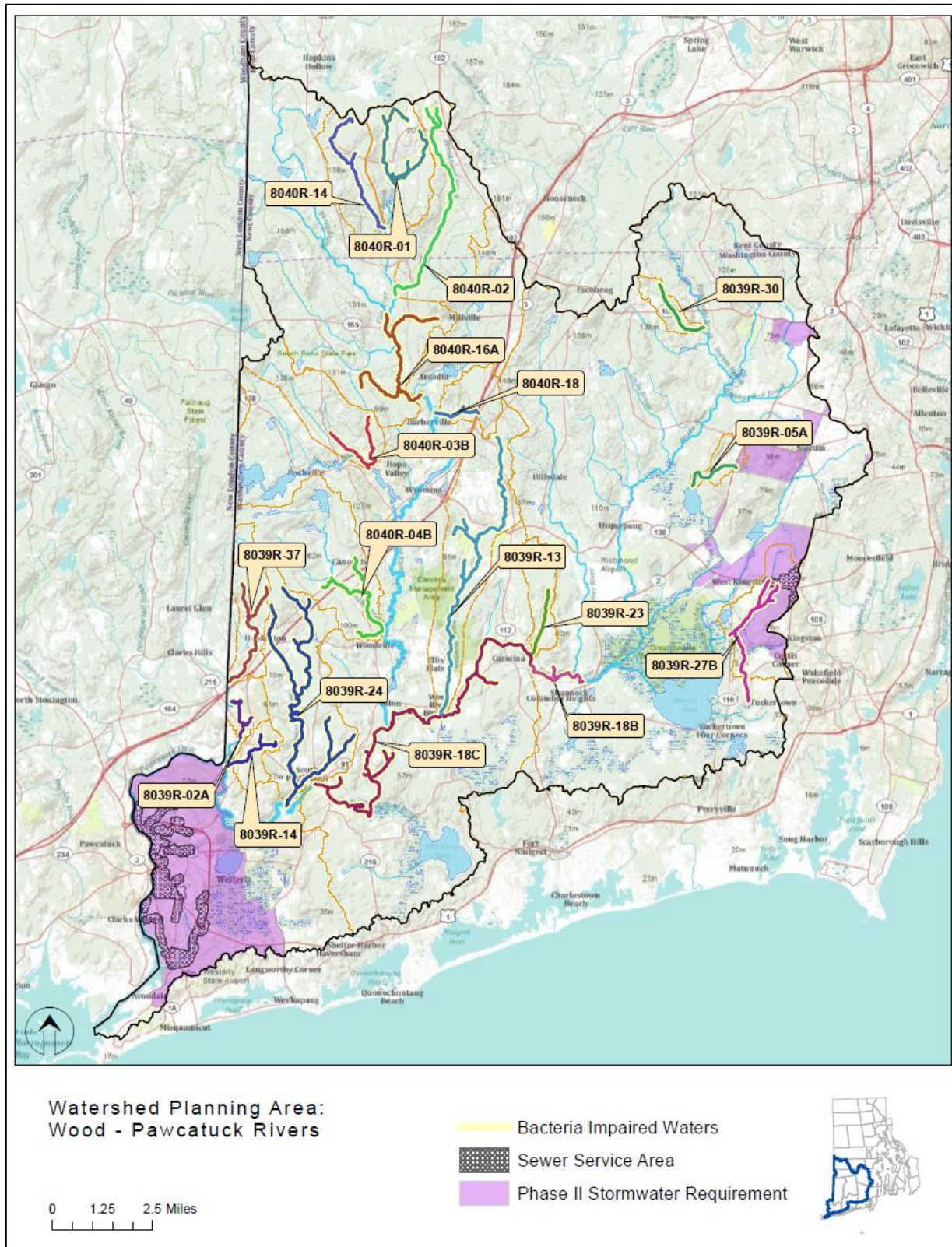


Figure 1: Map of the Wood-Pawcatuck Watershed Planning Area with impaired segments addressed in the Statewide Bacteria TMDL, sewer service areas, and stormwater regulated zones.

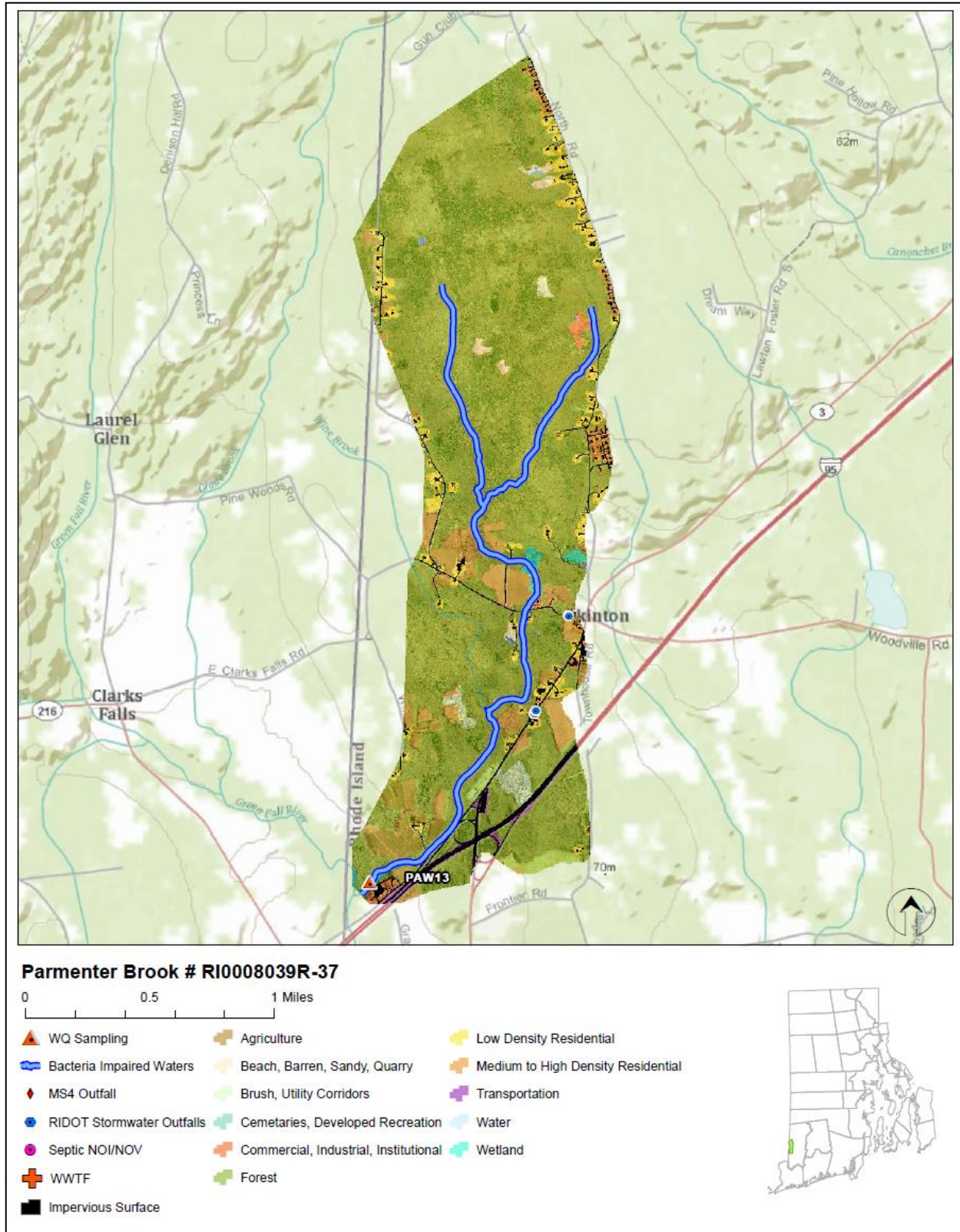


Figure 2: Map of the Parmenter Brook watershed with impaired segments, sampling location, and land cover indicated.

Why is a TMDL Needed?

Parmenter Brook is a Class A fresh water stream, and its applicable designated uses are primary and secondary contact recreation and fish and wildlife habitat (RIDEM, 2009). From 2005-2006, water samples were collected from one sampling location (PAW13) and analyzed for the indicator bacteria, enterococci. The water quality criteria for enterococci, along with bacteria sampling results from 2005-2006 and associated statistics are presented in Table 1. The geometric mean statistical metric was calculated for station PAW13. It exceeded the water quality criteria for enterococci. All samples were taken during dry-weather conditions. Possible dry weather sources are described in the sections below. Potential sources include improperly operating onsite wastewater treatment systems (OWTS), wastes from agriculture activities, as well as wastes from waterfowl, wildlife, and domestic pets.



Figure 3: Partial aerial view of the Parmenter Brook watershed. (Source: Google Maps)

Due to the elevated bacteria measurements presented in Table 1, Parmenter Brook does not meet Rhode Island's bacteria water quality standards, was identified as impaired, and was placed on the 303(d) list (RIDEM, 2008). The Clean Water Act requires that all 303(d) listed waters undergo a TMDL assessment that describes the impairments and identifies the measures needed to restore water quality. The goal is for all waterbodies to comply with state water quality standards.

Potential Bacteria Sources

There are several potential sources of bacteria in the Parmenter Brook watershed including malfunctioning onsite wastewater treatment systems; stormwater runoff from developed areas; agricultural activities; and waterfowl, wildlife, and domestic animal waste.

Onsite Wastewater Treatment Systems

All residents in the Parmenter Brook watershed rely on onsite wastewater treatment systems (OWTS) such as cesspools and septic systems. Failing OWTS can be significant sources of bacteria by allowing improperly treated waste to reach surface waters (RI HEALTH, 2003). If systems are improperly sized, malfunctioning, or in soils poorly suited for septic waste disposal, microorganisms such as bacteria, can easily enter surface water (USEPA, 2002). As shown in Figure 2, there have been no OWTS Notices of Violation/Notices of Intent to Violate (NOV/NOI) issued by the RIDEM Office of Compliance and Inspection in the Parmenter Brook watershed.

Agricultural Activities

Agricultural operations are an important economic activity and landscape feature in the state's rural areas. There are multiple agricultural operations located within the Parmenter Brook watershed, including a large agricultural operation near the mouth of the brook. Agricultural runoff may contain pollutants, such as bacteria. Agricultural practices such as allowing livestock to graze near streams, crossing livestock through waterbodies, spreading manure as fertilizer, and improper disposal of manure can contribute to bacterial contamination.

Waterfowl, Wildlife, and Domestic Animal Waste

Most of the Parmenter Brook watershed is undeveloped. Wildlife, including waterfowl, may be a significant bacteria source to surface waters. With the construction of roads and drainage systems, these wastes may no longer be retained on the landscape, but instead may be conveyed via stormwater to the nearest surface water. As such these physical land alterations can exacerbate the impact of these natural sources on water quality.

Residential development is concentrated along major road in the watershed. Waste from domestic animals, such as dogs, in these residential neighborhoods may also be contributing to bacteria concentrations in the Parmenter Brook.

Developed Area Stormwater Runoff

Though only a small portion of the Parmenter Brook watershed is developed, most of the development is concentrated along the eastern edge of the watershed. The Parmenter Brook watershed has an impervious cover of 3.3%. Impervious cover is defined as land surface areas, such as roofs and roads that force water to run off land surfaces, rather than infiltrating into the soil. Impervious cover provides a useful metric for the potential for adverse stormwater impacts. While runoff from impervious areas in the developed portions of the watershed may be contributing bacteria to Parmenter Brook, as discussed in Section 6.3 of the Core TMDL Document, as a general rule, impaired streams with watersheds having less than 10% impervious cover are assumed to be caused by sources other than urbanized stormwater runoff.

As part of Phase II requirements, the Rhode Island Department of Transportation (RIDOT) has identified and mapped stormwater outfalls within the Town of Hopkinton, including those for I-95 and Route 3. As shown in Figure 2, two outfalls are found in the Parmenter Brook watershed.

Existing Local Management and Recommended Next Steps

Additional bacteria data collection would be beneficial to support identification of sources of potentially harmful bacteria in the Parmenter Brook watershed. These activities could potentially include sampling at several different locations and under different weather conditions (e.g., wet and dry). Field reconnaissance surveys focused on stream buffers, stormwater runoff, and other source identification may also be beneficial.

Based on existing ordinances and previous investigations, the following steps are recommended to support water quality goals.

Onsite Wastewater Management

All residents of the Town of Hopkinton and the Parmenter Brook watershed rely on OWTS (septic systems or cesspools). The Town of Hopkinton has a draft Onsite Wastewater Management Plan that provides a framework for managing the OWTS. As part of the wastewater planning process, Hopkinton should adopt ordinances to establish enforceable mechanisms to ensure that existing OWTS are properly operated and maintained. RIDEM recommends that communities create an inventory of onsite systems through mandatory inspections. Inspections help encourage proper maintenance and identify failed and sub-standard systems. Policies that govern the eventual replacement of sub-standard OWTS within a reasonable time frame should be adopted. The Rhode Island Wastewater Information System (RIWIS) can help develop an initial inventory of OWTS and track voluntary inspection and pumping programs (RIDEM, 2010b).

The Town of Hopkinton is not eligible for the Community Septic System Loan Program (CSSLP). The CSSLP program provides low-interest loans to residents to help with maintenance and replacement of OWTS. It is recommended that the town develop a program to assist citizens with the replacement of older and failing systems.

Agricultural Activities

If not already in place, agricultural producers should work with the RIDEM Division of Agriculture and the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) to develop a conservation plan for farming activities in the watershed. NRCS and the RIDEM Division of Agriculture should ensure that all agricultural operations within the watershed have sufficient stream buffers, have fencing to restrict access of livestock and horses to streams and wetlands, and have animal waste handling, disposal, and other appropriate BMPs in place.

Stormwater Management

The Rhode Island Department of Transportation (RIDOT) is a municipal separate storm sewer (MS4) operator (RIPDES permit RIR040036) in the Parmenter Brook watershed and has prepared the required Phase II Stormwater Management Plan (SWMPP) for state-owned divided highways within the watershed. The Town of Hopkinton is not currently regulated under the Phase II Program.

The Town of Hopkinton does not currently have an ordinance to address illicit discharges. This type of ordinance prohibits illicit discharges to the storm drain system and provides an enforcement mechanism. It is recommended that any stormwater outfalls discharging in the vicinity of the sampling location be monitored to check for illicit discharges. Illicit discharges can be identified through continued dry weather outfall sampling and microbial source tracking.

RIDOT's SWMPP and its 2011 Compliance Update outline its goals for compliance with the General Permit. It should be noted that RIDOT has chosen to enact the General Permit statewide, beyond the General Permit's requirements regarding stormwater from urbanized and densely populated areas, as well as from divided highways outside of the urbanized and densely populated areas. RIDOT has finished mapping its outfalls throughout the state and is working to better document and expand its catch basin inspection and maintenance programs along with its BMP maintenance program. SWMPPs are being utilized for RIDOT construction projects. RIDOT also funds the University of Rhode Island Cooperative Extension's Stormwater Phase II Public Outreach and Education Project, which provides participating MS4s with education and outreach programs that can be used to address TMDL public education recommendations.

Since it is assumed that stormwater runoff is not the major contributor of bacteria to Parmenter Brook based on the watershed's imperviousness, RIDOT will see no changes to its Phase II permit requirements and no TMDL Implementation Plan (TMDL IP) will be required at this time.

Waterfowl, Wildlife, and Domestic Animal Waste

The Town of Hopkinton should develop education and outreach programs to highlight the importance of picking up after dogs and other pets, and not feeding waterfowl. Animal waste should be disposed of away from any waterway or stormwater system. Hopkinton should work with volunteers to map locations where animal waste is a significant and a chronic problem. The town should also evaluate strategies to reduce the impact of animal waste on water quality. This may include installing signage, providing pet waste receptacles or pet waste digester systems in high-use areas, enacting ordinances requiring clean-up of pet waste, and targeting educational and outreach programs in problem areas.

The town and residents can take several measures to minimize waterfowl-related impacts. They can allow tall, coarse vegetation to grow in areas along the shores of the Parmenter Brook that are frequented by waterfowl. Waterfowl, especially grazers like geese, prefer easy access to the water. Maintaining an uncut vegetated buffer along the shore will make the habitat less desirable to geese and encourage migration. With few exceptions, Part XIV, Section 14.13 of Rhode Island's Hunting Regulations prohibits feeding wild waterfowl at any time in the state of Rhode Island. Educational programs should emphasize that feeding waterfowl, such as ducks, geese, and swans, may contribute to water quality impairments in Parmenter Brook and can harm human health and the environment.

Land Use Protection

Woodland and wetland areas within the Parmenter Brook watershed absorb and filter pollutants from stormwater runoff, and help protect both water quality in the stream and stream channel stability. As these areas represent the majority of the land use in the watershed, it is important to preserve these undeveloped areas and institute controls on development in the watershed. The Hopkinton Land Trust was established in 2004 and has since protected 875 acres of land through property acquisition and conservation easements (Town of Hopkinton, 2011). The town should work with the land trust to protect more of the undeveloped land in Hopkinton, with a focus on lands around Parmenter Brook.

The steps outlined above will support the goal of mitigating bacteria sources and meeting water quality standards in Parmenter Brook.

Table 1: Parmenter Brook Bacteria Data

Waterbody ID: RI0008039R-37

Watershed Planning Area: 23 - Wood-Pawcatuck

Characteristics: Freshwater, Class A, Primary and Secondary Contact Recreation, Fish and Wildlife Habitat

Impairment: Enterococci (colonies/100mL)

Water Quality Criteria for Enterococci: Geometric Mean: 54 colonies/100 mL

Percent Reduction to meet TMDL: 10% (Includes 5% Margin of Safety)

Data: 2005-2006 from RIDEM

Single Sample Enterococci (colonies/100 mL) Results for Parmenter Brook (2005-2006) with Geometric Mean Statistics

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean *
PAW13	USGS gage #1118355 on Wich Way, Hopkinton	10/27/2006	1	Dry	57 (10%)*
PAW13	USGS gage #1118355 on Wich Way, Hopkinton	8/9/2006	980	Dry	
PAW13	USGS gage #1118355 on Wich Way, Hopkinton	5/31/2006	25	Dry	
PAW13	USGS gage #1118355 on Wich Way, Hopkinton	9/21/2005	440	Dry	
Shaded cells indicate an exceedance of water quality criteria * Includes 5% Margin of Safety					

Wet and Dry Weather Enterococci Geometric Mean Values for Station PAW13

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
PAW13	USGS gage #1118355 on Wich Way, Hopkinton	2005-2006	0	4	57	NA	57
Shaded cells indicate an exceedance of water quality criteria Weather condition determined from rain gage at URI in Kingston, RI							

References

- RIDEM (2008). State of Rhode Island and Providence Plantations 2008 303(d) List – List of Impaired Water Bodies. Rhode Island Department of Environmental Management.
- RIDEM (2009). State of Rhode Island and Providence Plantations Water Quality Regulations. Amended December, 2009. Rhode Island Department of Environmental Management.
- RIDEM (2010a). MS4 Compliance Status Report for RI Statewide Bacteria TMDL. Rhode Island Department of Environmental Management.
- RIDEM (2010b). Total Maximum Daily Load Analysis for the Pawcatuck River and Little Narragansett Bay Waters (Bacteria Impairments). Rhode Island Department of Environmental Management.
- RI HEALTH (2003). Aquidneck Island Drinking Water Assessment Results, Source Water Protection Assessment conducted by the University of Rhode Island for the Rhode Island Department of Health, Office of Drinking Water Supply.
- Town of Hopkinton (2010). Town of Hopkinton Comprehensive Plan 5- Year Update. Online: http://www.hopkintonri.org/pdfs_downloads/Planning/Hopkinton%20Comp%20Plan%20Update%20Oct%201%202010%20FINAL%20-%20amended%20101510.pdf
- USEPA (2002). Onsite Wastewater Treatment Systems Manual – Office of Water, Office of Research and Development – EPA/625/R-00/008. Online: www.epa.gov/owm/septic/pubs/septic_2002_osdm_all.pdf.