



Canonchet Brook

Watershed Description

This **TMDL** applies to the Canonchet Brook assessment unit (RI0008040R-04B), a 4.6-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 to the east by Connecticut. Canonchet Brook is located in the central and eastern portions of town. The Canonchet Brook watershed is presented in Figure 2 with land use types indicated.

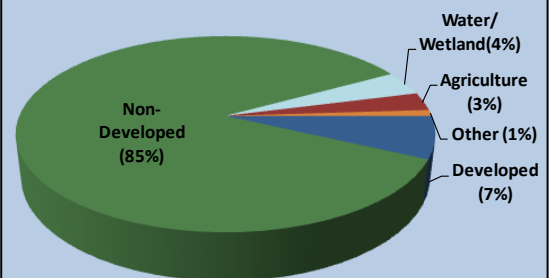
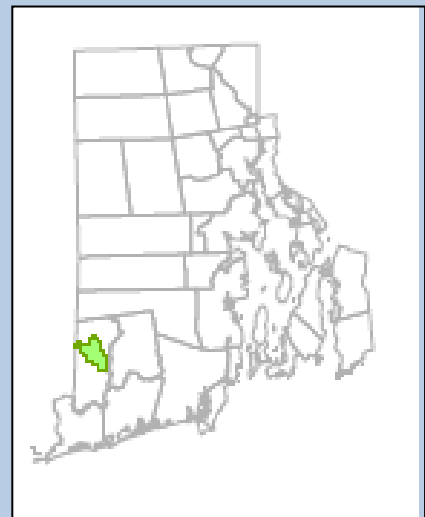
The main stem of Canonchet Brook begins at the outlet of Blue Pond in Hopkinton, RI. The brook flows south and joins the small outlet stream from Ashville Pond. The brook continues south and joins with a western branch of Canonchet Brook that originates at the foothills of Brightman Hill. The impaired segment of Canonchet Brook begins at the confluence of the western branch and the main stem. The brook then flows under Route 3 and Interstate 95 (I-95).

The eastern branch of Canonchet Brook originates in a residential area just north of Route 3 and is also impaired for bacteria. This branch joins the main stem just south of I-95 in the Lindhbrook Country Club. The brook then flows south through the Black Farm Wildlife Management Area and empties into the Wood River along the border with Richmond, RI.

The Canonchet Brook watershed covers 7.7 square miles. Non-developed areas, including the Black Farm Wildlife Management Area, occupy a large portion (85%) of the watershed. Developed uses (including residential and commercial uses) cover approximately 7%. Wetland and other surface waters occupy 4% and agricultural land uses occupy 3% of the watershed. Other land uses combine to cover the remaining 1%.

Assessment Unit Facts *(RI0008040R-04B)*

- **Town:** Hopkinton
- **Impaired Segment Length:** 4.6 miles
- **Classification:** Class B
- **Direct Watershed:** 7.7 mi² (4917 acres)
- **Impervious Cover:** 2.6%
- **Watershed Planning Area:** Wood - Pawcatuck (#23)



Watershed Land Uses

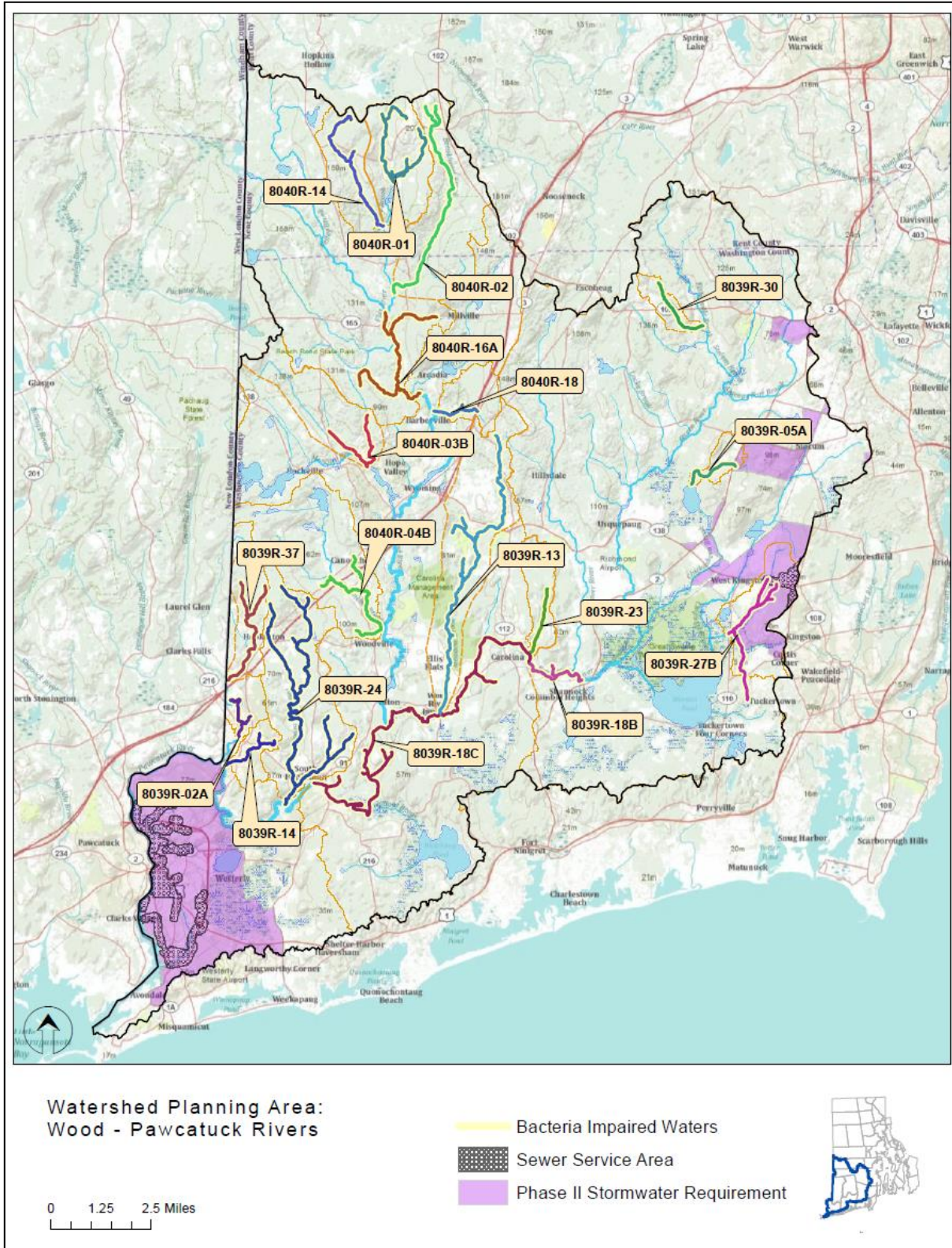


Figure 1: Map of the Wood-Pawcatuck Watershed Planning Area with impaired segments addressed by the Statewide Bacteria TMDL, sewer service areas, and stormwater regulated zones.

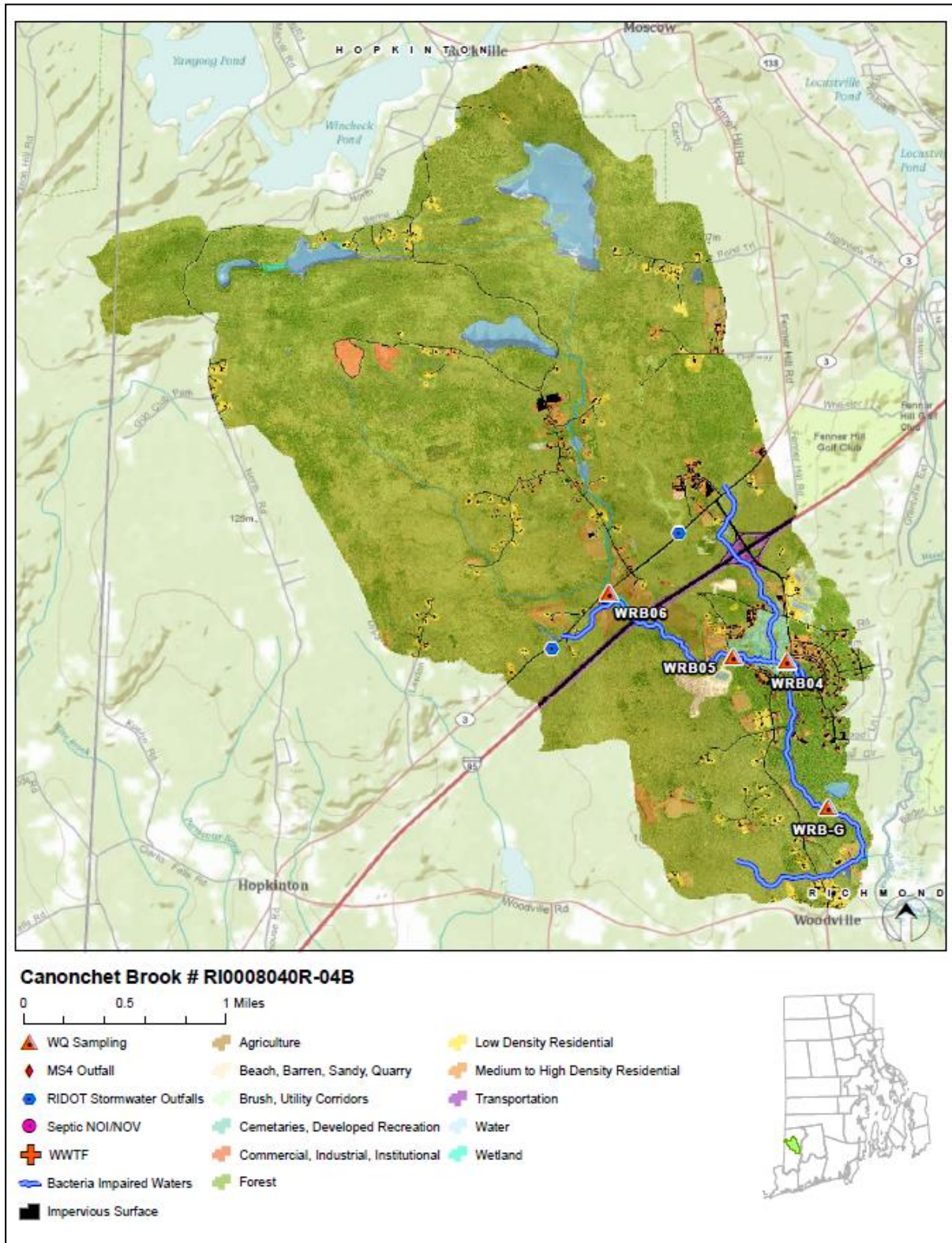


Figure 2: Map of the Canonchet Brook watershed with impaired segment, sampling locations, and land cover indicated.

Why is a TMDL Needed?

Canonchet Brook is a Class B fresh water stream, and its applicable designated uses are primary and secondary contact recreation and fish and wildlife habitat (RIDEM, 2009). From 2004 to 2005, and in 2008, water samples were collected from four sampling locations (Figure 2) and analyzed for the indicator bacteria, enterococci. The water quality criteria for enterococci, along with bacteria sampling results from 2004-2005 and 2008 are presented in Table 1.

The geometric mean exceeded the water quality criteria for enterococci at stations WRB04 and WRB05. WRB05 is located upstream of Lindhbrook Country Club at Palmer Circle, while WR04 is located downstream of the Country Club. All samples were taken in 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 agricultural activities, as well as wastes from waterfowl, wildlife, and domestic pets.

Due to the elevated bacteria measurements presented in Table 1, Canonchet Brook does not meet Rhode Island's bacteria water quality standards, is 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.

Canonchet Brook has previously been assessed by RIDEM as impaired for copper and lead. No TMDLs have been completed to address these impairments.



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

Potential Bacteria Sources

There are several potential sources of bacteria in the Canonchet Brook watershed including malfunctioning septic systems, waterfowl, wildlife, and domestic animal waste, and stormwater runoff from developed areas.

Onsite Wastewater Treatment Systems

All residents in the Canonchet 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 Notice of Violation/Notice of Intent to Violate (NOV/NOIs) issued by the RIDEM Office of Compliance and Inspection in the Canonchet 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 in the Canonchet Brook watershed, including several east of Nooseneck Hill Road, upstream of station WRB05. Agricultural runoff may contain pollutants, including 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. Cattle and other animals should be restricted from entering Canonchet Brook to restrict animal waste from entering the brook and wetland areas. A stream buffer should also be reestablished.

Waterfowl, Wildlife and Domestic Animal Waste

Most of the northern portion of the Canonchet Brook watershed is located in the Arcadia Management Area, and the southern portion of the watershed is located in the Black Farm Wildlife Management Area. 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 in the central portion of the watershed near Interstate 95. Waste from domestic animals, such as dogs, in these residential neighborhoods may also be contributing to bacteria concentrations in the Canonchet Brook.

Geese are known to congregate in open areas including recreational fields and golf courses. In addition, to creating a nuisance, large numbers of geese can also create unsanitary conditions on the grassed areas and cause water quality problems due to bacterial contamination associated with their droppings. Large populations of geese can also lead to habitat destruction as a result of overgrazing on wetland and riparian plants. Lastly, large populations of Canada Geese are also problematic for farmers as they are known to destroy cover crops, which leads to erosion of farm fields and potential further habitat damage downstream.

Developed Area Stormwater Runoff

Though only a small portion of the Canonchet Brook watershed is developed, most of the development is concentrated in the central portion of the watershed around I-95. The watershed has an impervious cover of 2.6%. 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 these portions of the watershed may be contributing bacteria to Canonchet 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.

The Rhode Island Department of Transportation (RIDOT) has identified and mapped stormwater outfalls within the Town of Hopkinton, including those for Route 3 and I-95. As shown in Figure 2, two outfalls are found in the Canonchet Brook watershed, and are located near the headwaters of the brook near Route 3.

Other Potential Sources

The Lindhbrook Country Club golf course is located at the confluence of the two branches of Canonchet Brook. The two sampling stations located within the boundaries of the country club exceeded the water quality standards for enterococci, suggesting a potential dry weather source both at the golf course and directly upstream of the golf course.

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 Canonchet 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 in the Canonchet 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 an onsite wastewater planning process, Hopkinton should adopt ordinances to establish an enforceable mechanism to ensure that existing OWTS are properly operated and maintained. RIDEM recommends that all 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 can 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 U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) and the RIDEM Division of Agriculture to develop conservation plans for farming activities within 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.

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 Canonchet 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 the Canonchet Brook and can harm human health and the environment. In addition to the options discussed above, there are various options for controlling nuisance populations of geese congregating in open areas. These other options can include making the habitat less hospitable for geese, using dogs or loud noises to discourage geese from congregating, or even hunting.

Stormwater Management

RIDOT is a municipal separate storm sewer system (MS4) operator (RIPDES permit RIR040036) in the Canonchet Brook watershed and has prepared the required Phase II Stormwater Management Plan for state-owned divided highways (I-95) 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. Dry weather enterococci values exceed criteria at both WR04 and WR05. It is recommended that any stormwater outfalls discharging in the near vicinity of these sampling locations 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.

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

Land Use Protection

Woodland and wetland areas within the Canonchet 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 Canonchet Brook 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 Canonchet Brook.

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

Table 1: Canonchet Brook Bacteria Data

Waterbody ID: RI0008040R-04B

Watershed Planning Area: 23 – Wood-Pawcatuck

Characteristics: Freshwater, Class B, 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: 50% (Include 5% Margin of Safety)

Data: 2004-2005; 2008 from RIDEM

Single Sample Enterococci (colonies /100 mL) Results for Canonchet Brook (2004-2005; 2008) with Geometric Mean Statistics

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
WRB06	Route 3 crossing - USGS 1118005	8/1/2008	23	Dry	23
WRB06	Route 3 crossing - USGS 1118005	7/7/2005	37	Dry	
WRB06	Route 3 crossing - USGS 1118005	5/5/2005	1	Dry	
WRB06	Route 3 crossing - USGS 1118005	8/1/2008	310	Dry	
WRB05	Canonchet Brook - Palmer Circle	8/1/2008	83	Dry	69
WRB05	Canonchet Brook - Palmer Circle	7/7/2005	61	Dry	
WRB05	Canonchet Brook - Palmer Circle	5/5/2005	11	Dry	
WRB05	Canonchet Brook - Palmer Circle	8/20/2004	410	Dry	
WRB04	Baseline Station BL08-Woodville-Alton Rd	8/1/2008	99	Dry	98 [†] (50%)*
WRB04	Baseline Station BL08-Woodville-Alton Rd	7/7/2005	240	Dry	
WRB04	Baseline Station BL08-Woodville-Alton Rd	5/5/2005	17	Dry	
WRB04	Baseline Station BL08-Woodville-Alton Rd	8/20/2004	230	Dry	
WRB-G	Canonchet Brook downstream of WRB04	7/7/2005	140	Dry	24
WRB-G	Canonchet Brook downstream of WRB04	5/5/2005	4	Dry	

Shaded cells indicate an exceedance of water quality criteria

* Includes 5% Margin of Safety

† Indicates the geometric mean used to calculate percent reduction

Wet and Dry Weather Geometric Mean Enterococci Values for each Station

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
WRB04	Baseline Station BL08-Woodville-Alton Rd	2004-2008	0	4	98	NA	98
WRB05	Palmer Circle	2004-2008	0	4	69	NA	69
WRB06	Route 3 crossing - USGS 1118005	2004-2008	0	4	23	NA	23
WRB-G	Downstream of WRB04	2005	0	2	24	NA	24

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.
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- 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:
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