



Winsor Brook

Watershed Description

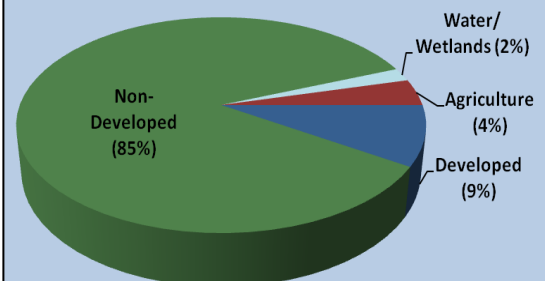
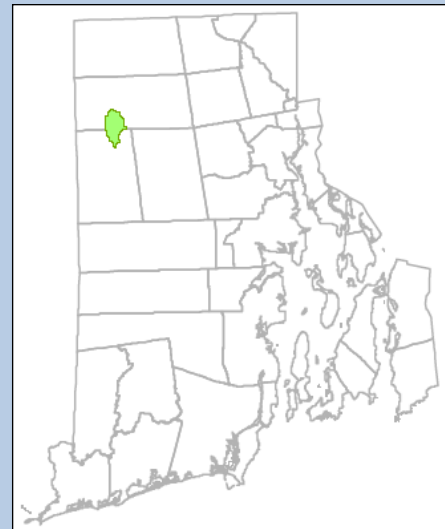
This **TMDL** applies to the Winsor Brook assessment unit (RI0006015R-30), a 3.5-mile long stream located in Foster, RI (Figure 1). The Town of Foster is located in the northwestern portion of the state and is bordered to the east by Scituate, to the west by Killingly, Connecticut, to the north by Glocester, and to the south by Coventry. Winsor Brook is located in the northern portion of town, and extends into rural Glocester. The Winsor Brook watershed is presented in Figure 2 with land use types indicated.

The headwaters of Winsor Brook begin as three tributaries in the southern portion of Glocester. The eastern branch of the brook begins as Killy Brook just east of the Ponaganset Reservoir. The western branch, including Hannah Brook, begins south of Old Snake Road in Glocester. Killy Brook joins Winsor Brook in a wetland area south of Route 101. The western tributary enters Winsor Brook above an agriculture area on Winsor Road. Winsor Brook crosses Winsor Road and continues through a woodland area before it empties into the Ponaganset River.

The Winsor Brook watershed covers 4.5 square miles. The majority of the watershed is non-developed, (85%). Developed uses (including residential, transportation, and commercial uses) occupy approximately 9%. Agricultural land uses occupy 4% and surface water and wetlands occupy 2% of the watershed.

Assessment Unit Facts *(RI0006015R-30)*

- **Town:** Foster
- **Impaired Segment Length:** 3.5 miles
- **Classification:** Class AA
- **Direct Watershed:** 4.5 mi² (2,848 acres)
- **Impervious Cover:** 3.5%
- **Watershed Planning Area:** Pawtuxet (#12)



Watershed Land Uses

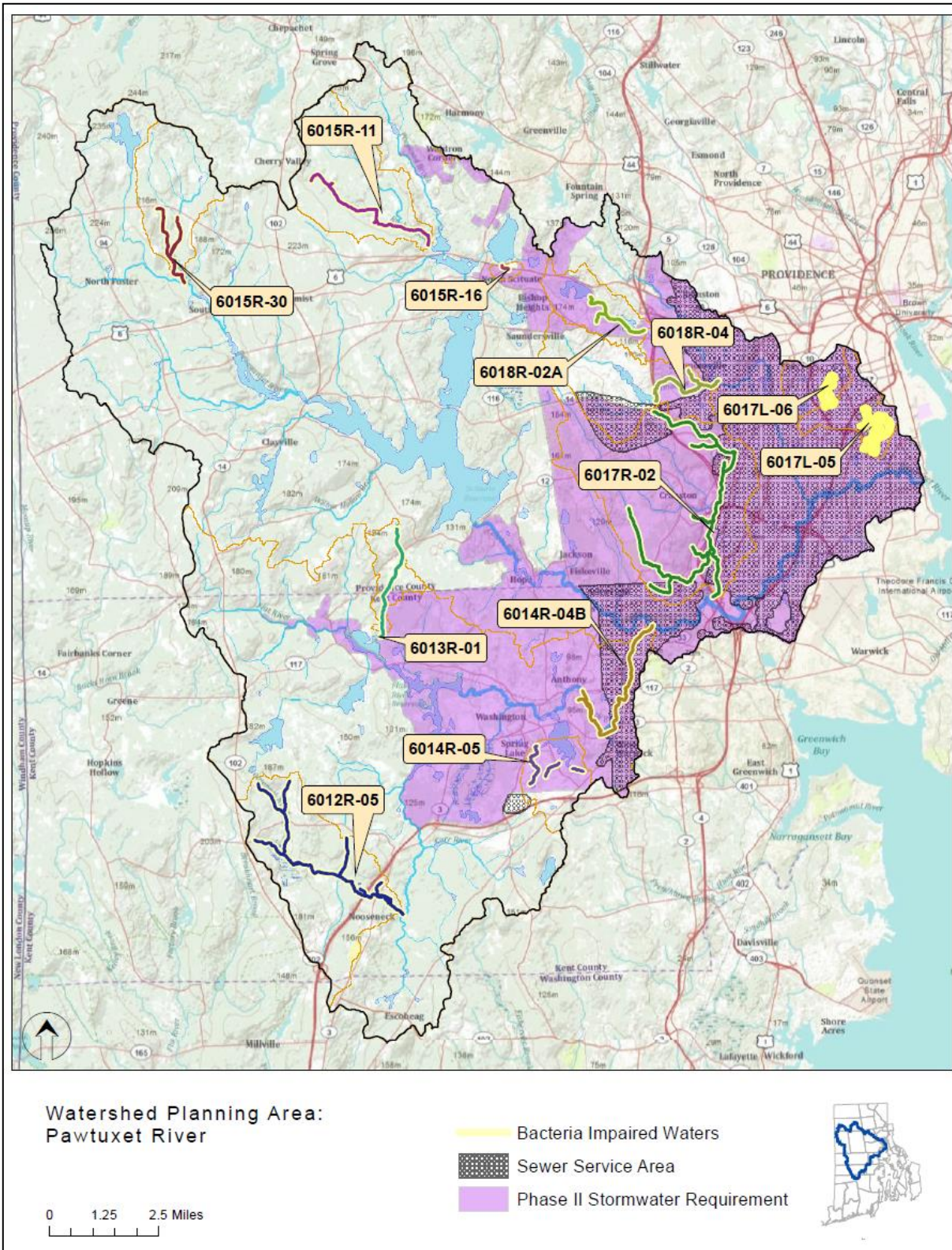
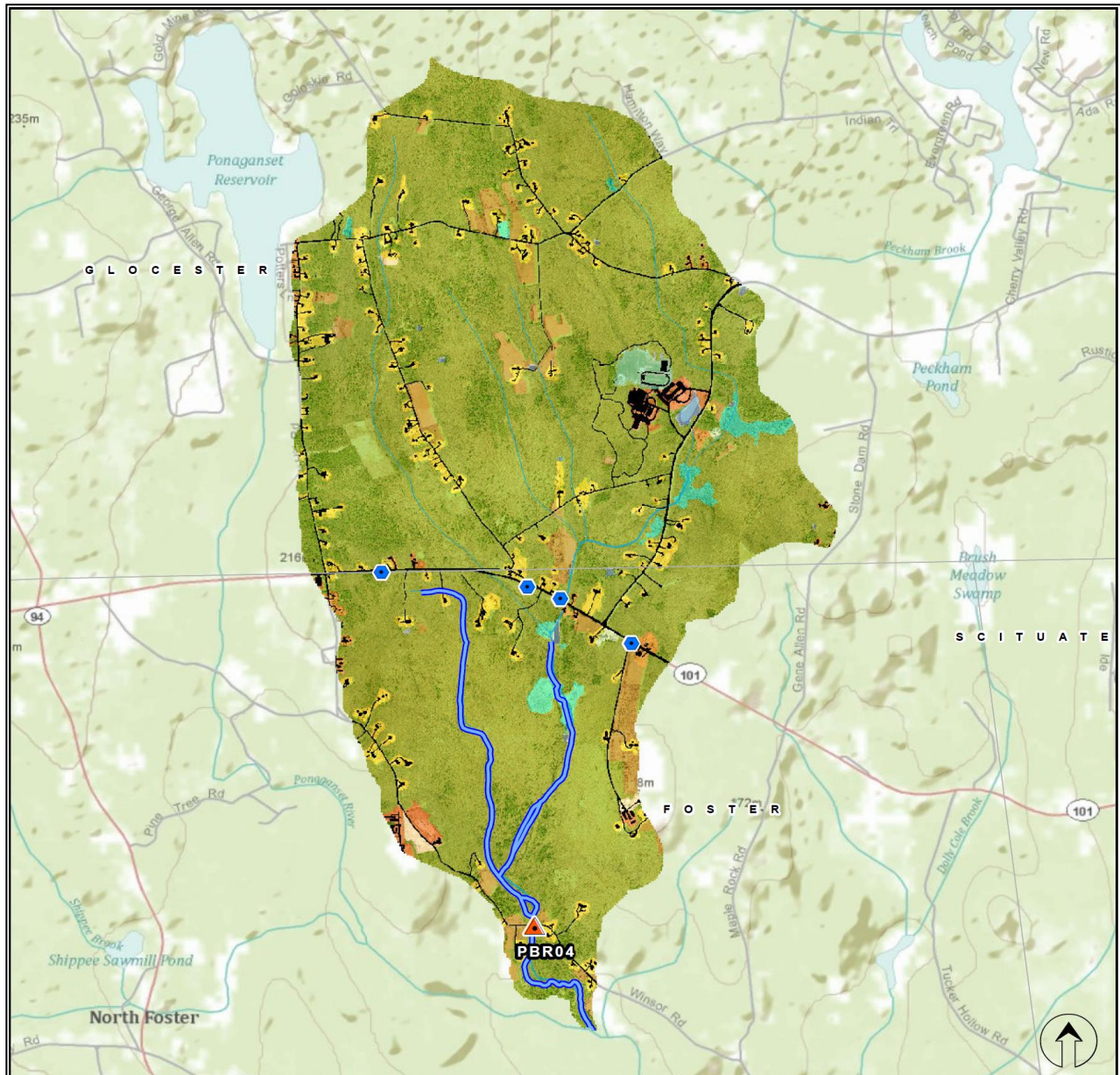
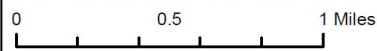


Figure 1: Map of the Pawtuxet Watershed Planning Area with impaired segments addressed by the Statewide Bacteria TMDL, sewered areas, and stormwater regulated zones.



Winsor Brook # RI0006015R-30



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|---------------------------|---------------------------------------|------------------------------------|
| WQ Sampling | Agriculture | Low Density Residential |
| MS4 Outfall | Beach, Barren, Sandy, Quarry | Medium to High Density Residential |
| RIDOT Stormwater Outfalls | Brush, Utility Corridors | Transportation |
| Septic NOI/NOV | Cemeteries, Developed Recreation | Water |
| WWTF | Commercial, Industrial, Institutional | Wetland |
| Bacteria Impaired Waters | Forest | |
| Impervious Surface | | |



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

Why is a TMDL Needed?

Winsor Brook is a Class AA fresh water stream, and is a tributary within the Scituate Reservoir watershed, which is the source of supply to the Providence Water Supply Board public drinking water supply system. However, as it is not a terminal reservoir, its applicable designated uses are primary and secondary contact recreation (RIDEM, 2009). From 2007-2008, water samples were collected from one sampling location (PBR04), and analyzed for the indicator bacteria, enterococci. The water quality criteria for enterococci, along with bacteria sampling results from 2007-2008 and associated statistics are presented in Table 1. The geometric mean was calculated for Station PBR04 and exceeded the water quality criteria for enterococci. All samples were taken in dry-weather conditions.

Due to the elevated bacteria measurements presented in Table 1, Winsor 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.

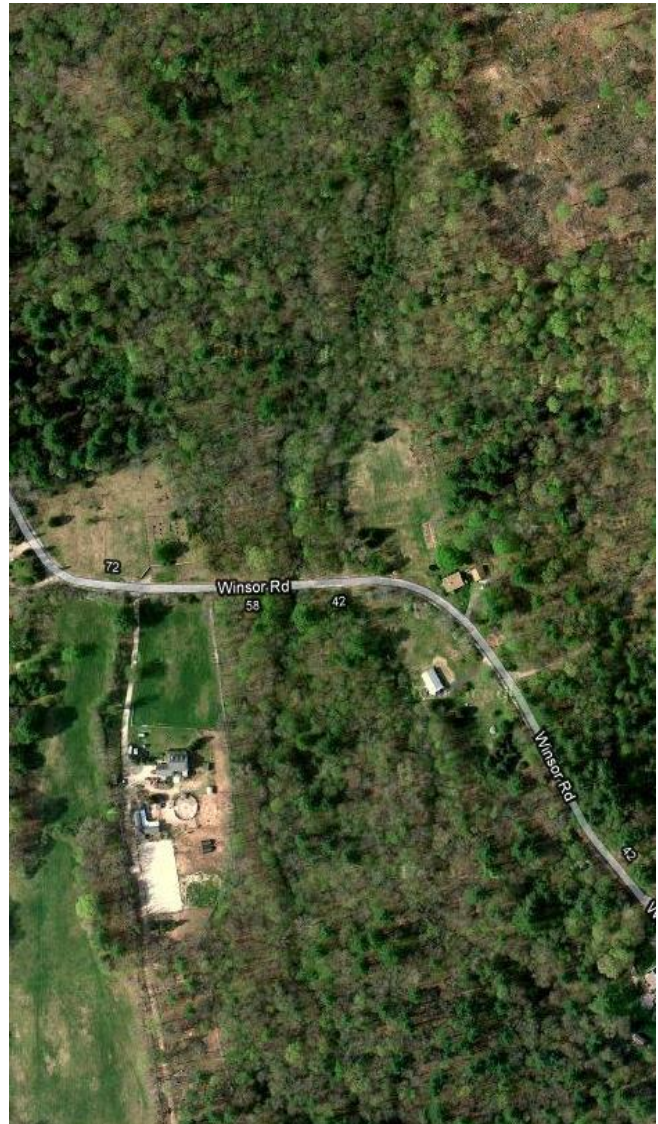


Figure 3: *Partial aerial view of the Winsor Brook watershed near the sampling station PBR04, on Winsor Road. (Source: Google Maps)*

Potential Bacteria Sources

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

Onsite Wastewater Treatment Systems

All residents in the Winsor 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). However, 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, no OWTS Notices of Violation/Notices of Intent to Violate have been issued by the RIDEM Office of Compliance and Inspection in the Winsor Brook watershed.

Agricultural Activities

Agricultural operations are an important economic activity and landscape feature in the state's rural areas. The Town of Foster has identified agricultural animal waste runoff as a potential bacteria source to surface waters in the town (Town of Foster, 2003). Agricultural land use occupies 4% of the watershed area. Agricultural operations are scattered throughout the watershed in Foster and Glocester and include multiple operations near the sampling station on Winsor Brook. These operations include the Lily Rose Farm, a 100-acre crop and goat farm in Foster. Agricultural activities such as allowing animals to graze near streams, crossing animals 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 Winsor 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.

Low-density residential development is found throughout the watershed along the roadways. Tributaries to Winsor Brook flow through residential areas on Anan Wade and Joe Sarle Roads in the northern portion of the watershed. Waste from domestic animals, such as dogs, in these residential neighborhoods, may also be contributing to bacteria concentrations in Winsor Brook.

Developed Area Stormwater Runoff

Though the majority of the Winsor Brook watershed is undeveloped, impervious surfaces cover approximately 3.5%, particularly along roadways. Impervious cover is defined as land surface areas, such as roofs and roads, that force water to run off of 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 developed portions of the watershed may be contributing bacteria to Winsor 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 Foster. As shown in Figure 2, four outfalls are found in the Winsor Brook watershed, along Route 101.

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 Winsor Brook watershed. These activities could include sampling at several different locations and under different weather conditions (e.g., wet and dry). Field reconnaissance surveys focusing 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 Foster and the Winsor Brook watershed rely on OWTS. The Town of Foster has an Onsite Wastewater Management Plan that provides a framework for managing the OWTS. The town currently does not have an ordinance to enforce routine maintenance and pumping of OWTS. As part of an onsite wastewater management planning process, the Foster should adopt an ordinance to establish enforceable mechanisms 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 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).

Foster is not currently 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 Foster develop a program to assist citizens with the replacement of older and failing systems.

Agricultural Activities

If not already in place, the U.S. Department of Agriculture Natural Resources Conservation Service and the RIDEM Department of Agriculture should work with agricultural operations, including Lily Rose Farm, to develop conservation plans for farming activities. These plans should ensure that there are sufficient stream buffers, that fencing exists to restrict access of livestock and horses to streams and wetlands, and that animal waste handling, disposal, and other appropriate BMPs in place.

Waterfowl, Wildlife, and Domestic Animal Waste

The Town of Foster should develop education and outreach programs to highlight the importance of picking up after dogs and other pets and not feeding waterfowl. Animal wastes should be disposed of away from any waterway or stormwater system. Foster should work with volunteers to map locations where animal waste is a significant and 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.

Towns and residents can take several measures to minimize waterfowl-related impacts. The Brook's shores are largely vegetated. However, if the shore has been cleared, residents can allow tall, coarse vegetation to grow in areas along the shores of Winsor 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 Winsor Brook and can harm human health and the environment.

Stormwater Management

RIDOT (RIPDES permit RIR040036) is a municipal separate storm sewer (MS4) operator in the Winsor Brook watershed and has prepared a Phase II Stormwater Management Plan (SWMPP) for state-owned roads within Rhode Island. Though the Town of Glocester (RIPDES permit RIR040038) is regulated by

the Phase II program, the Winsor Brook watershed is outside of the Phase II regulated area. The Town of Foster is not regulated under the Phase II program.

The Town of Foster does not currently have an ordinance to address illicit discharges (Town of Foster, 2003). 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 statewide. It should be noted that RIDOT has chosen to enact the General Permit statewide, not just for the urbanized and densely populated areas that are required by the permit. 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 Winsor Brook based on the watershed's imperviousness, RIDOT and Gloucester 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

The majority of Winsor Brook watershed is undeveloped, however only a small portion of the watershed is protected as open space. As source waters to Providence's water supply, preserving these natural areas is particularly important. Woodland and wetland areas within the Winsor Brook watershed absorb and filter pollutants from stormwater runoff, and help protect both water quality in the stream and stream channel stability. It is important to preserve these undeveloped areas, and institute controls on development in the watershed.

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

Table 1: Winsor Brook Bacteria Data

Waterbody ID: RI0006015R-30

Watershed Planning Area: 12 – Pawtuxet

Characteristics: Freshwater, Class AA, Tributary within a Public Drinking Water Supply, Primary and Secondary Contact Recreation

Impairment: Enterococci (colonies/100mL)

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

Percent Reduction to meet TMDL: 29% (Includes 5% Margin of Safety)

Data: 2007-2008 from RIDEM

Single Sample Enterococci (colonies/100 mL) Results for Winsor Brook (2007-2008) including Geometric Mean Statistics

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
PBR04	Winsor Road off of Old Danielson Pike	8/18/2008	36	Dry	71 (29%)*
PBR04	Winsor Road off of Old Danielson Pike	7/16/2008	214	Dry	
PBR04	Winsor Road off of Old Danielson Pike	7/1/2008	210	Dry	
PBR04	Winsor Road off of Old Danielson Pike	5/20/2008	1	Dry	
PBR04	Winsor Road off of Old Danielson Pike	10/3/2007	1120	Dry	
Shaded cells indicate an exceedance of water quality criteria					
*Includes 5% Margin of Safety					

Wet and Dry Weather Geometric Mean Enterococci Values for Station PBR04

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
PBR04	Winsor Road off of Old Danielson Pike	2007-2008	0	5	71	NA	71
Shaded cells indicate an exceedance of water quality criteria							
Weather conditions determined from the Weather Underground rain gage in Willimantic, CT							

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 (2010). Total Maximum Daily Load Analysis for the Pawcatuck River and Little Narragansett Bay Waters (Bacteria Impairments). Rhode Island Department of Environmental Management.
- RIHEALTH (2003). The Scituate Reservoir Drinking Water Assessment Results. University of Rhode Island Cooperative Extension in cooperation with Rhode Island Department of Health Source Water Assessment Program, Office of Drinking Water Quality.
- Town of Foster (2003). Foster Comprehensive Plan. Town of Foster Planning Board. Updated 2003.
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- 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.