



Acid Factory Brook

Watershed Description

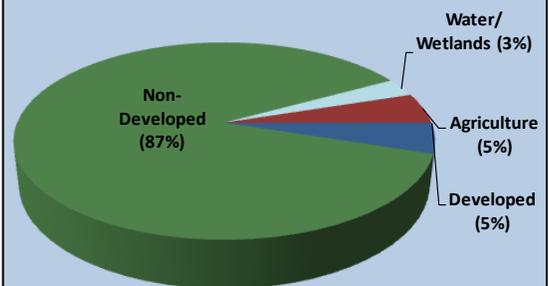
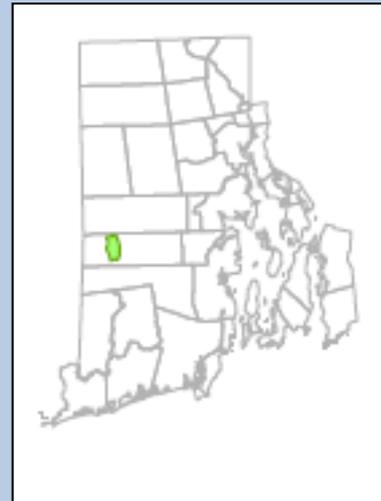
This **TMDL** applies to the Acid Factory Brook assessment unit (RI0008040R-01), a 4.3-mile long stream located in West Greenwich, RI (Figure 1). The Town of West Greenwich is located in the western portion of the state and Acid Factory Brook is located in the central section of town. The Acid Factory Brook watershed is presented in Figure 2 with land use types indicated.

The western branch of Acid Factory Brook begins in an agricultural area that includes a 100-acre Christmas Tree Farm near Welch Hollow Road and Plain Meeting House Road in West Greenwich, RI. This branch of the brook flows south along the eastern border of the Wickaboxet Wildlife Management Area and flows through residential developments along Plain Meeting House Road. The eastern branch of Acid Factory Brook begins just south of Plain Meeting House Road in the southern portion of the tree farm. This branch flows south and crosses Stubble Hill Road, an area characterized by low-density residential development. The two branches of Acid Factory Brook join in a wetland area just north of Browns Corner Road. The brook then flows into Eisenhower Lake. Acid Factory Brook continues at the outlet of the lake, though this section of the brook is not impaired for bacteria. The brook continues south and joins with Phillips Brook to form the Flat River in the northern portion of the Arcadia Management Area.

The Acid Factory Brook watershed covers 4.14 square miles. Non-developed areas occupy a large portion (87%) of the watershed. Developed and agricultural uses each occupy 5%. Surface water and wetlands occupy 3% and include Eisenhower Lake.

Assessment Unit Facts *(RI0008040R-01)*

- **Town:** West Greenwich
- **Impaired Segment Length:** 4.3 miles
- **Classification:** Class A
- **Direct Watershed:** 4.14 mi² (2651 acres)
- **Impervious Cover:** 2.7%
- **Watershed Planning Area:** Wood - Pawcatuck (#23)



Watershed Land Uses

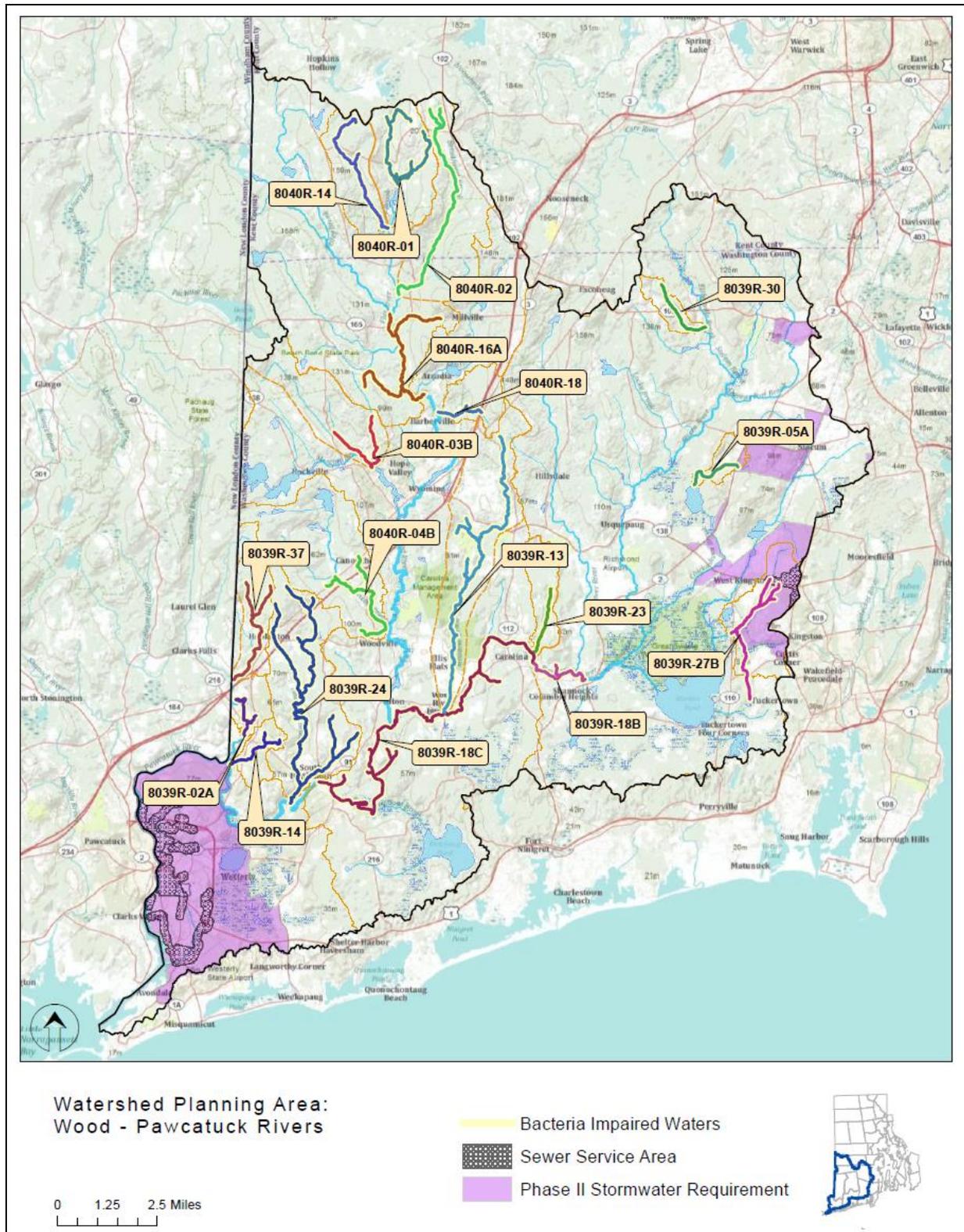


Figure 1: Map of the Wood-Pawcatuck Watershed Planning Area with impaired segments in the Statewide Bacteria TMDL, sewered areas, and stormwater regulated zones.

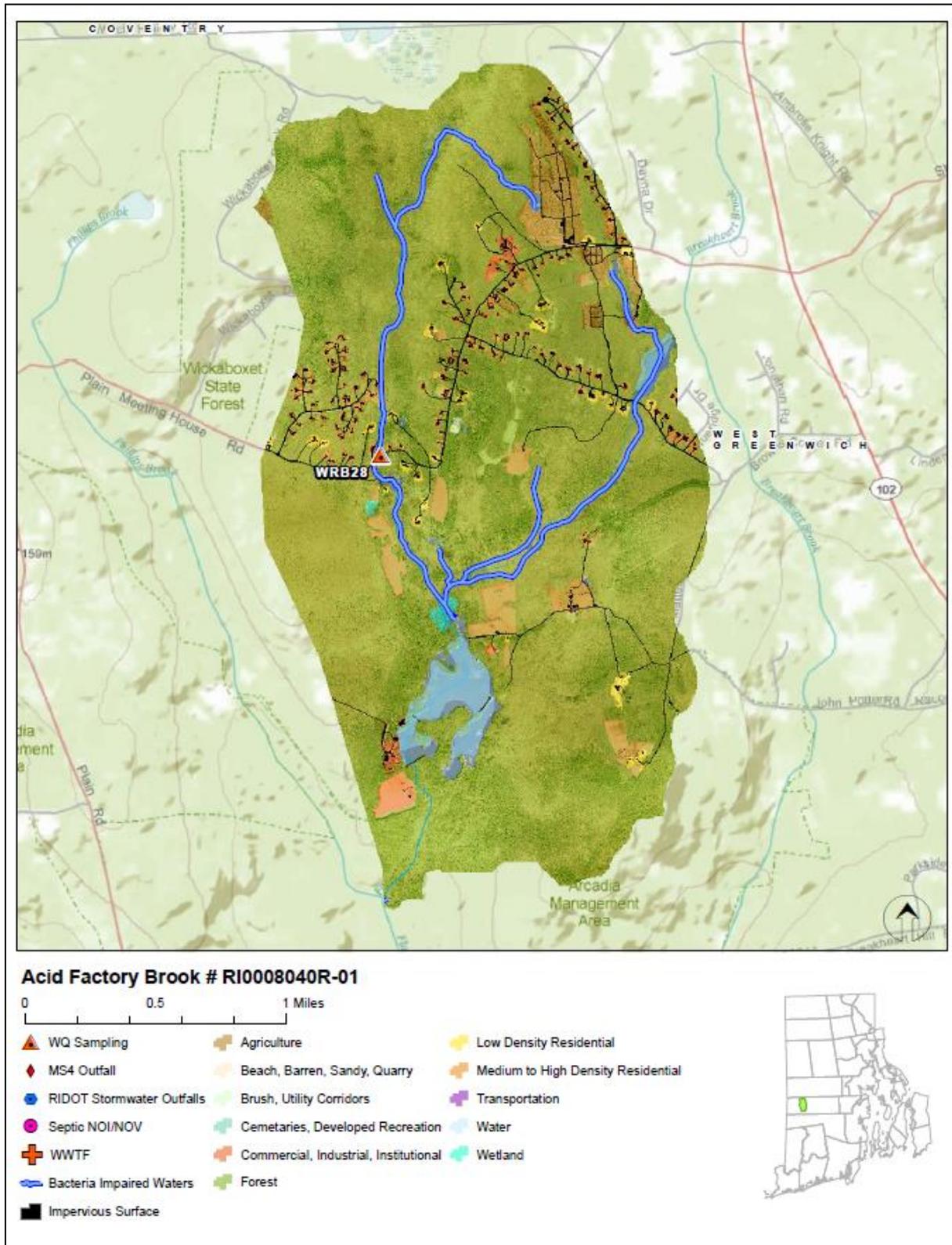


Figure 2: Map of the Acid Factory Brook watershed with impaired segment, sampling location, and land cover indicated.

Why is a TMDL Needed?

Acid Factory Brook is a Class A freshwater stream, and its applicable designated uses are primary and secondary contact recreation and fish and wildlife habitat (RIDEM, 2010a). In 2011 water samples were collected from one sampling location on Acid Factory Brook at Plains Meeting House Road (station WRB28) and analyzed for the indicator bacteria, enterococci. The water quality criteria for enterococci, along with bacteria sampling results from 2011 and associated statistics are presented in

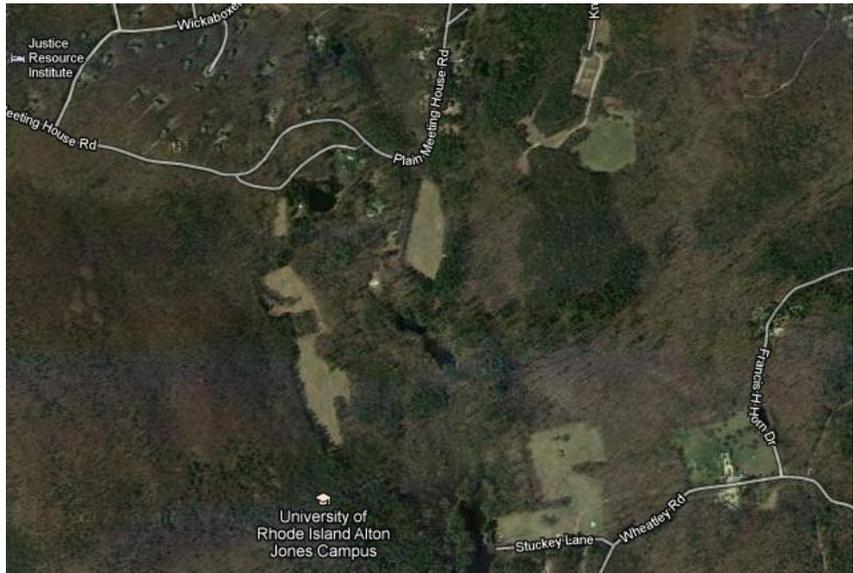


Figure 3: Partial aerial view of the Acid Factory Brook Watershed (Source: Google Maps)

Table 1. The geometric mean was calculated for station WRB28 and it exceeded the water quality criteria for enterococci. All samples were taken in dry-weather and thus represent dry-weather conditions in Acid Factory Brook.

Due to the elevated bacteria measurements presented in Table 1, Acid Factory Brook was identified as impaired and was placed on the 303(d) list (RIDEM, 2012). 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.

Potential Bacteria Sources

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

Agricultural Activities

Agricultural operations are recognized as an important economic activity and landscape feature in the state's rural areas. Agricultural uses occupy 5% of the land area in the Acid Factory Brook watershed. Agricultural runoff may contain multiple pollutants, including bacteria, and may be contributing bacteria to Acid Factory Brook. While the headwaters of Acid Factory Brook originate near a large Christmas

Tree farm in West Greenwich, agricultural practices directly related to Christmas Tree farming are not expected to contribute bacteria to the Brook.

Onsite Wastewater Treatment Systems

All residents in the Acid Factory Brook watershed rely on onsite wastewater treatment systems (OWTS) such as septic systems and cesspools. 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, no OWTS Notice of Violation/Notice of Intent to Violate (NOV/NOIs) have been issued by the RIDEM Office of Compliance and Inspection in the Acid Factory Brook watershed.

Waterfowl, Wildlife, and Domestic Animal Waste

The Acid Factory Brook watershed is predominately undeveloped and includes a portion of the Wickaboxet Wildlife Management Area. These forested areas are also home to various wildlife and waterfowl. Waste from these animals may be contributing bacteria to Acid Factory Brook.

Though only a small portion of the watershed is characterized by residential development, much of this development is located near the headwaters and central portion of the brook. Waste from domestic animals such as dogs, may also be contributing to bacteria concentrations in Acid Factory Brook.

Developed Area Stormwater Runoff

The Acid Factory Brook watershed has an impervious cover of 2.7%. 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 Acid Factory Brook, as discussed in Section 6.3 of the Core TMDL Document, impaired streams with watersheds having less than 10% impervious cover are assumed to be caused by sources other than urbanized stormwater runoff.

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 Acid Factory 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.

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 conservation plans for their farming activities within the watershed. NRCS and the RIDEM Division of Agriculture should continue to work with agricultural operations in the watershed, particularly the 100 acre Christmas Tree Farm in the northern portion of the watershed, to ensure that there is sufficient stream buffer and appropriate BMPs are in place.

Onsite Wastewater Management

All residents of the Acid Factory Brook watershed rely on OWTS. As part of an onsite wastewater management planning process, West Greenwich should develop an Onsite Wastewater Management Plan and adopt ordinances 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).

Town of West Greenwich is not eligible for the Community Septic System Loan Program (CSSLP) because it has not developed an On-Site Wastewater Management Plan, the Town. The CSSLP program provides low-interest loans to residents to help with maintenance and replacement of OWTS. It is recommended that West Greenwich develop an On-Site Wastewater Management Plan, so that its residents may take advantage of the low interest loans to replace older and failing systems.

Waterfowl, Wildlife, and Domestic Animal Waste

Education and outreach programs should highlight the importance of picking up after dogs and other pets and not feeding birds. Animal wastes should be disposed of away from any waterway or stormwater system that discharges to the area. West Greenwich should work with volunteers to map locations where animal waste is a significant and chronic problem. 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 bird-related impacts. They can allow tall, coarse vegetation to grow in areas along the shores of Acid Factory 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, contributes to water quality impairments in Acid Factory 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 Acid Factory Brook watershed and has prepared the required Phase II Stormwater Management Program Plan (SWMPP). Though the Town of West Greenwich (RIPDES permit RIR040029) is regulated by the Phase II program, the Acid Factory Brook watershed is outside of the Phase II regulated area.

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.

In 2009, the Town of West Greenwich adopted an ordinance to address illicit discharges. This type of ordinance prohibits illicit discharges to the storm drain system and provides an enforcement mechanism. The town should select priority areas to identify and eliminate illicit discharges in the Acid Factory Brook watershed, particularly in the vicinity of the sampling location. Illicit discharges can be identified through continued dry weather outfall sampling and microbial source tracking.

As it is assumed that stormwater runoff is not the major contributor of bacteria to Acid Factory Brook based on the watershed's imperviousness, RIDOT and West Greenwich 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 Acid Factory Brook watershed, particularly in the Wickaboxet Wildlife Management Area and the southern portion of the watershed, absorb and filter pollutants from stormwater runoff, and help protect both water quality in the stream and stream channel stability (Berger, 2003). As these areas represent a large portion of the land use in the Acid Factory Brook watershed, 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 Acid Factory Brook.

Table 1: Acid Factory Brook Bacteria Data

Waterbody ID: RI0008040R-01

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: 56% (Includes 5% Margin of Safety)

Data: 2011 from RIDEM

Single Sample Enterococci (colonies/100 mL) Results for Acid Factory Brook (2004-2005) with Geometric Mean Statistics

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
WRB28	Acid Factory Brook-Plains Meeting House Rd	06/22/2011	58.1	Dry	110.3
WRB28	Acid Factory Brook-Plains Meeting House Rd	07/19/2011	77.6	Dry	
WRB28	Acid Factory Brook-Plains Meeting House Rd	08/11/2011	304	Dry	
WRB28	Acid Factory Brook-Plains Meeting House Rd	09/26/2011	108	Dry	
WRB28	Acid Factory Brook-Plains Meeting House Rd	10/18/2011	12.1	Dry	
Shaded cells indicate an exceedance of water quality criteria					

Wet and Dry Weather Geometric Mean Enterococci Values for Station WRB28

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
WRB28	Acid Factory Brook-Plains Meeting House Rd	2011	0	5	110.3	NA	110.3
Shaded cells indicate an exceedance of water quality criteria							
Weather condition determined from the rain gage at Westerly Airport in Westerly, RI							

References

- Berger, Louis (2003). Phase II Storm Water Management Plan for the Town of West Greenwich, RI. October 2003.
- RIDEM (2010a). State of Rhode Island and Providence Plantations Water Quality Regulations. Amended December, 2010b. 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.
- RIDEM. 2012. *State of Rhode Island 2012 303(d) List: List of Impaired Waters, Final August 2012*, Rhode Island Department of Environmental Management, Office of Water Resources, Providence, RI.
- 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.
- 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.