



# Pawcatuck River Segment 18D

## Watershed Description

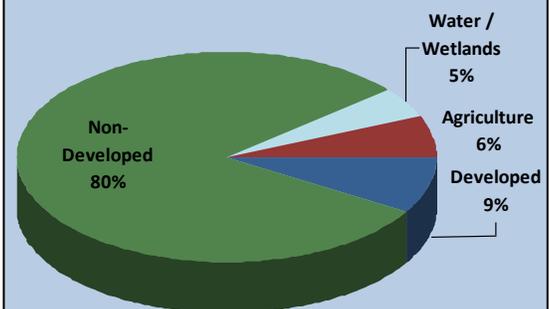
This **TMDL** applies to the segment of the Pawcatuck River from the Bradford Dyeing Associates WWTF discharge point to the Route 3 bridge crossing (RI0008039R-18D), a 5.53-mile long stream segment located in Hopkinton and Westerly, RI (Figure 1). The Pawcatuck River watershed is presented in Figures 2 and 3 with land use types indicated.

The headwaters of the Pawcatuck River are located in Wordens Pond in South Kingstown. Just west of Route 2 and Great Swamp near the Village of Kenyon begins one of two impaired segments that were addressed in 2011 as part of the Statewide Bacteria TMDL. The first of these segments (RI00080439R-18B) ends just before Route 112, while the second segment (RI00080439R-18C) extends from just west of Route 112 near the border of Richmond and Charlestown in the Village of Carolina to the Village of Bradford, along the Hopkinton-Westerly town border (RIDEM, 2011).

This TMDL covers the Pawcatuck River from the Bradford Dying discharge point west to the Route 3 bridge crossing. In this segment, the River is the boundary between Hopkinton and Westerly. It runs parallel to and between Chase Hill Road in Hopkinton and the railroad tracks in Westerly. The lack of road crossings and the large wetland complexes that surround the River prevent land-based sampling of this segment. Tomaquag Brook in Hopkinton and McGowan Brook and Aguntaug Brook in Westerly discharge to the Pawcatuck River in this segment. A bacteria TMDL for Tomaquag Brook was completed as part of the Statewide Bacteria TMDL. Aguntaug Brook drains Chapman Pond. The Pawcatuck River continues through

## Assessment Unit Facts (RI0008039R-18D)

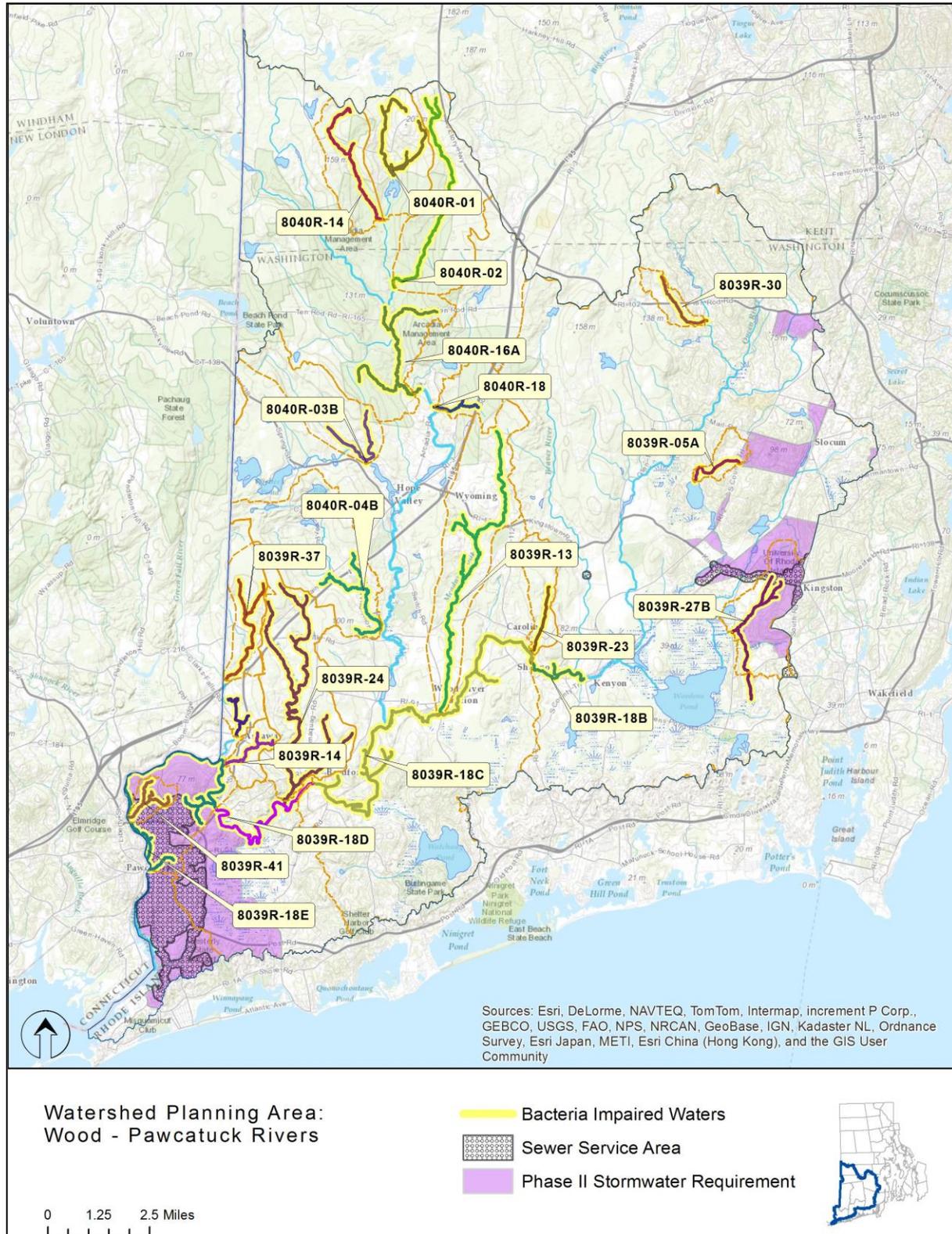
- **Towns:** Hopkinton and Westerly
- **Impaired Segment Length:** 5.53 miles
- **Classification:** Class B1
- **Direct Watershed:** 239 mi<sup>2</sup> (153,237 acres)
- **Impervious Cover:** 3.8%
- **Watershed Planning Area:** Pawcatuck – Pawcatuck (#23)



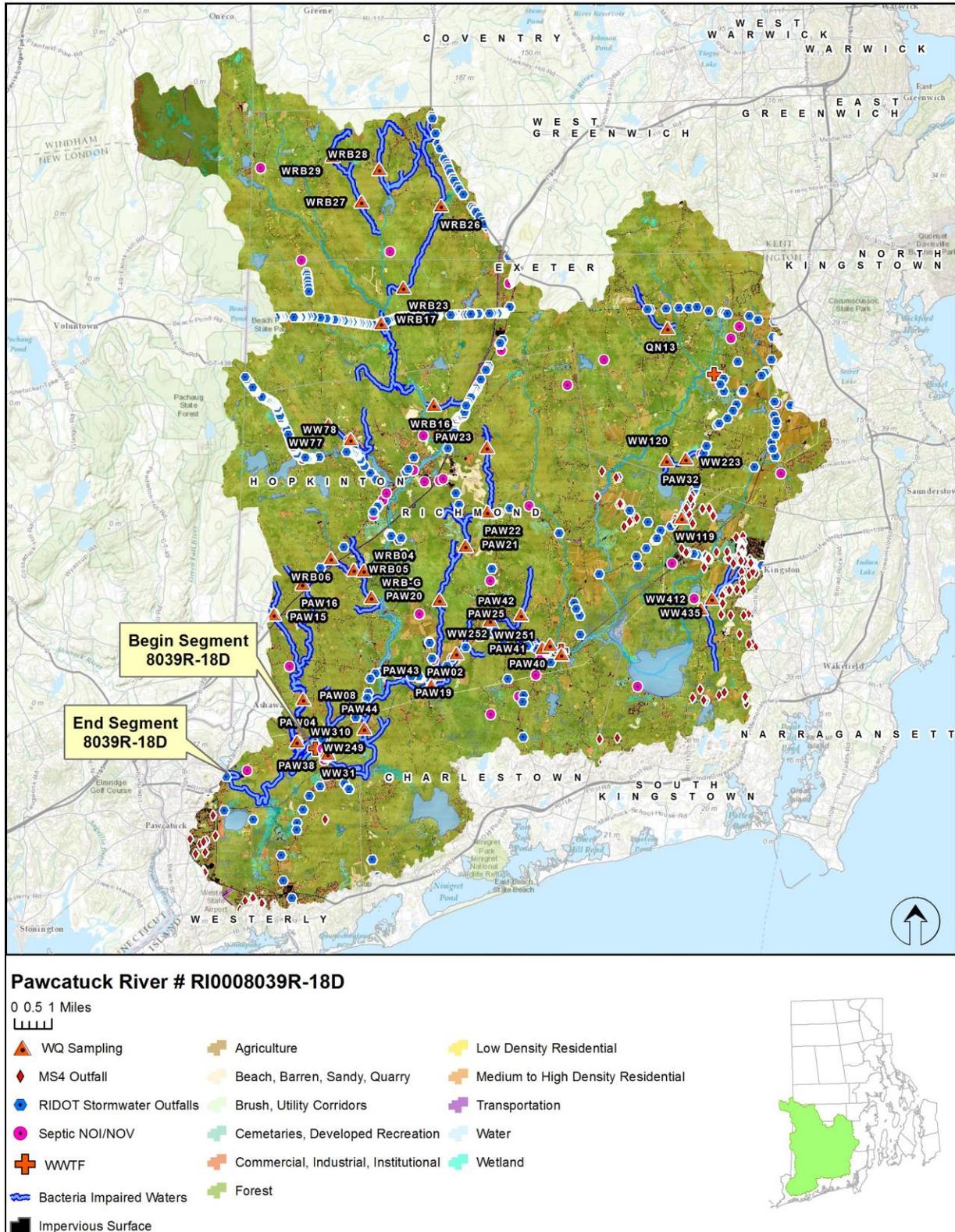
**Watershed Land Uses**

Westerly and eventually empties into Little Narragansett Bay.

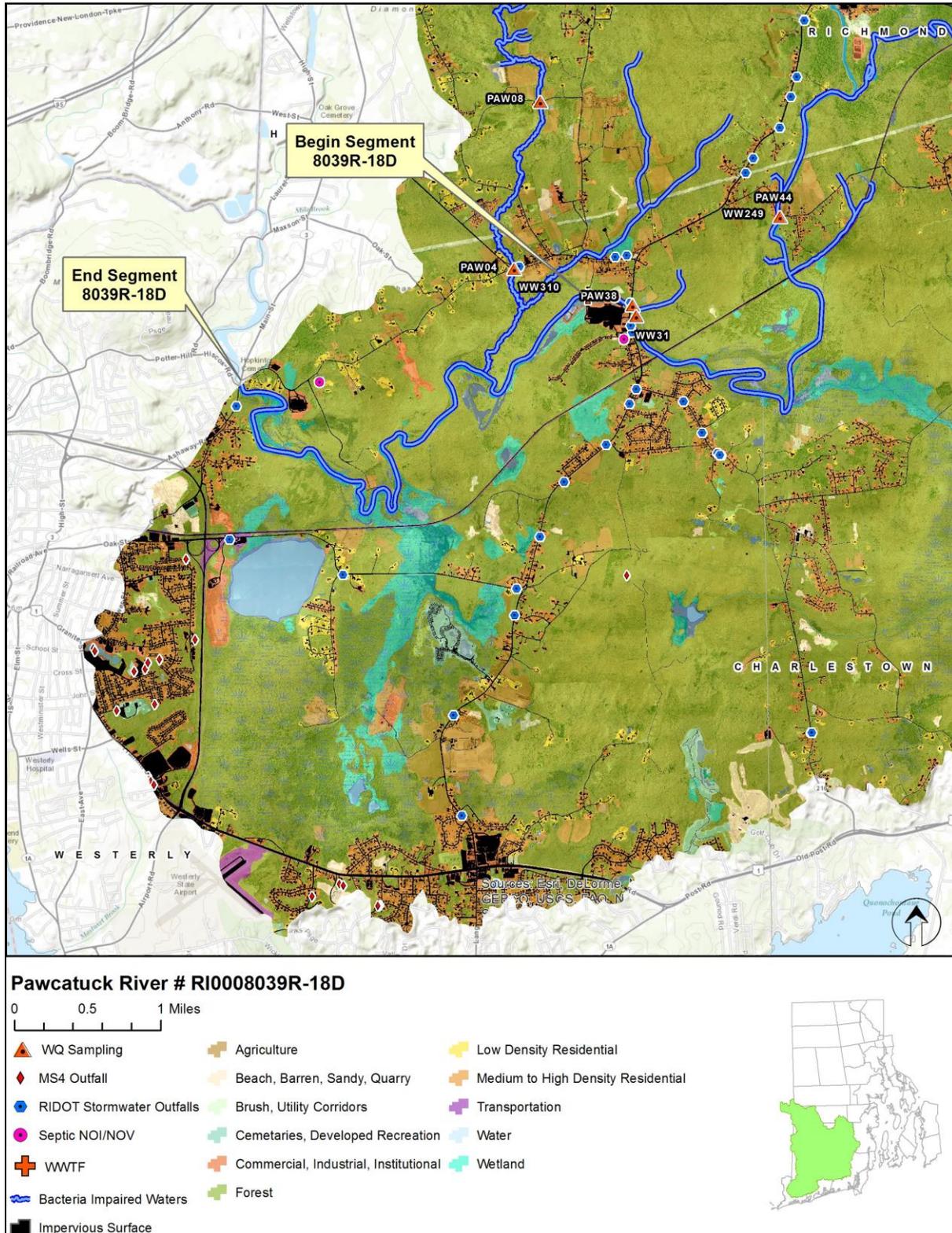
This segment of the Pawcatuck River watershed covers 239 square miles. Non-developed areas occupy a large portion (80%) of the watershed. Developed uses cover approximately 9%. Agricultural land uses occupy 6% and wetlands and other surface waters account for 5%.



**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.**



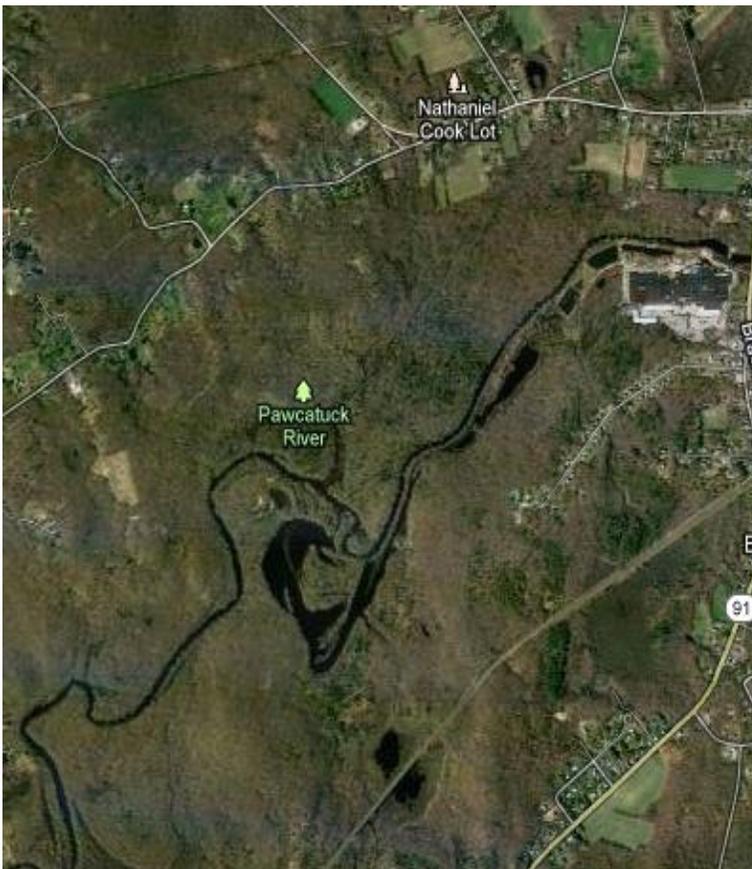
**Figure 2: Map of the Pawcatuck River (Segment 18D) watershed with impaired segments, sampling locations, and land cover indicated.**



**Figure 3: Zoomed map of the Pawcatuck River (Segment 18D) watershed with impaired segments, sampling locations, and land cover indicated.**

### Why is a TMDL Needed?

The Pawcatuck River Segment 18D is a Class B1 freshwater stream, and its applicable designated uses are primary and secondary contact recreation and fish and wildlife habitat. While primary recreational activities may be impacted due to pathogens from approved discharges to Class B1 waters, all Class B criteria must be met (RIDEM, 2010b). This segment of the Pawcatuck River historically received industrial and sanitary effluent from Bradford Printing and Finishing Company, a textile manufacturing company, in the Village of Bradford, in Westerly, RI.



**Figure 4: Partial aerial view of the Pawcatuck River watershed. (Source: Google Maps)**

As mentioned previously, a lack of road crossings and the presence of large wetland complexes prevent land-based sampling of this segment. Water quality data collected at the first station in next downstream segment<sup>1</sup>, located on the downstream side of the Route 3 bridge (Figures 2 and 3) was used to assess water quality in Segment 18D. The Route 3 bridge is the boundary between the two segments. Samples were taken in 2011 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 Table 1. To aid in identifying possible bacteria sources, the geometric mean was also calculated for wet-weather and dry-weather sampling days, where appropriate. While dry weather geometric means could be calculated, there were not enough wet weather samples to calculate a geometric mean. The dry-weather geometric mean values met the water quality criteria for enterococci at this station.

As indicated by the elevated bacteria measurements presented in Table 1, the Pawcatuck River Segment 18D does not meet Rhode Island's bacteria water quality standards, is identified as impaired, and has

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<sup>1</sup> RIDEM analyzed water quality data from Pawcatuck River just upstream of segment 18D and found that it met criteria using data from the Statewide Bacteria TMDL (RIDEM, 2011b) and more recent data. The geometric mean of four samples collected station PAW38 in 2011 by ARM was 41.2 colonies per 100 mL.

been 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. 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 Pawcatuck River watershed including malfunctioning onsite wastewater treatment systems, agricultural activities, waterfowl and wildlife waste, stormwater runoff from developed areas, and Tomaquag Brook. Bacteria data collected under dry weather conditions just upstream of this segment meet water quality criteria indicating that the bacteria sources are within this waterbody segment.

Tomaquag Brook discharges into this segment of the Pawcatuck River. As shown in the Statewide Bacteria TMDL, the highest bacteria concentrations in Tomaquag Brook are at the station located closest to Tomaquag Brook's confluence with the Pawcatuck River. While both dry and wet weather data exceeded water quality standards, the wet weather bacteria data was much higher than the dry weather data (RIDEM, 2011b).

#### Bradford Printing and Finishing (Bradford)

Bradford Printing and Finishing (Bradford), RIPDES permit RI0000043, formerly operated a commercial textile mill located in Westerly, RI along the Pawcatuck River. Bradford performed washing, dyeing, printing, and finishing of woven fabrics. The discharge historically consisted of treated industrial wastewater effluent generated by Bradford, treated domestic wastewater from Bradford's buildings and some off-site properties, and stormwater. Treatment was accomplished through the use of an equalization/pH adjustment lagoon, an activated sludge treatment lagoon, and a clarifier with a discharge to the Pawcatuck River through an effluent diffuser. In 2011, DEM notified Bradford that the wastewater treatment system was no longer providing adequate treatment and required corrective action. Bradford's operations went into receivership in the Fall of 2012, and the assets were liquidated. To the present time, the owner of the property has continued to occupy and lease space in the buildings. DEM understands that there are some discharges of stormwater and domestic wastewater from on-site and off-site residential/commercial properties at the site. Lack of adequate sanitary waste disposal at the site has been an ongoing problem. DEM has not been able to resolve the problem amicably with the owner and is seeking legal remedies.

#### Onsite Wastewater Treatment Systems

All residents in the town of Hopkinton rely on onsite wastewater treatment systems (OWTS), such as septic systems and cesspools. While sections of the Town of Westerly rely on a municipal sanitary

sewer system, the area surrounding this impaired segment of the Pawcatuck River is not located near the sewer areas of Westerly, and all residents living near the river rely on OWTS. Failing OWTS can be significant sources of bacteria by allowing improperly treated wastewater 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 Figures 2 and 3, multiple OWTS Notices of Violation/Notices of Intent to Violate (NOV/NOI) have been issued by the RIDEM Office of Compliance and Inspection in the Pawcatuck River watershed.

### Agricultural Activities

The Pawcatuck River watershed has multiple agricultural operations. Comprising 6% of the land cover in this sub-watershed, agricultural operations are an important economic activity and landscape feature in the state's rural areas. However, agricultural runoff may contain multiple 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. While this impaired segment does not directly contain many agricultural operations, Tomaquag Brook, an impaired water which discharges to this waterbody includes over 400 acres of agricultural operations that are located in the southern portion of its watershed, near Tomaquag Brook's confluence with the Pawcatuck River (RIDEM, 2011b).

### Wildlife and Waterfowl Waste

Approximately 80% of the Pawcatuck River 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 infrastructure to the nearest surface water. As such these physical land alterations can exacerbate the impact of these natural sources on water quality. The impaired segment of the Pawcatuck River flows through woodland and wetland areas. Waste from wildlife and waterfowl that frequent these areas may be contributing bacteria to the Pawcatuck River Segment 18D.

### Developed Area Stormwater Runoff

Approximately 9% of the Pawcatuck River watershed is developed and most of the development is concentrated along major roads in the watershed. The Pawcatuck River watershed has an impervious cover of approximately 3.8%. 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 the Pawcatuck River, 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 in the Pawcatuck River watershed. As shown in Figures 2 and 3, due to the lack of roads directly adjacent to this waterbody segment, there are no RIDOT-owned stormwater outfalls discharging directly to the River.

### 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 Pawcatuck River 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.

#### Bradford Printing and Finishing (Bradford)

As noted above, Bradford has ceased manufacturing operations but the owner of the property continues to utilize the buildings, and adequate sanitary waste disposal at this property is an ongoing problem. RIDEM continues to pursue legal action to have the owner install permanent wastewater and stormwater disposal solutions that will correct the problem.

#### Onsite Wastewater Management

Most, if not all of the residents of this portion of the Pawcatuck River watershed rely on OWTS (septic systems or cesspools). Westerly and Hopkinton have approved Onsite Wastewater Management Plans. These plans provide a framework for managing the OWTS. 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, 2010c).

Rhode Island's Community Septic System Loan Program (CSSLP) allows towns to assist citizens with the replacement of older and failing systems through low-interest loans. Portions of the Town of

Westerly have been approved for CSSLP, while the entire Town of Hopkinton is not currently eligible for CSSLP. The portions of Westerly located in this segment's watershed appear to be covered by CSSLP (RIDEM, 2011a). 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, particularly in the Tomaquag Brook watershed, 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 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. Targeted funding for the Tomaquag Brook watershed is available through the NRCS National Water Quality Initiative, which targets Environmental Quality Incentives Program (EQIP) to priority watersheds in each state. Priority watersheds were selected using input from local partnerships and state water quality agencies (NRCS, 2013).

#### Wildlife and Waterfowl Waste

The towns 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. The towns 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.

Towns and residents can take several measures to minimize the impacts of wildlife and waterfowl to the Pawcatuck River. They can allow tall, coarse vegetation to grow in areas along the shores of the Pawcatuck River that are frequented by waterfowl and wildlife. 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 the Pawcatuck River and can harm human health and the environment.

#### Stormwater Management

RIDOT (RIPDES permit RIR040036) is a municipal separate storm sewer (MS4) operator in the Pawcatuck River watershed has prepared a Phase II Stormwater Management Plan (SWMPP) for state-owned roads in Rhode Island. Though the Town of Westerly (RIPDES permit RIR044014) is regulated by the Phase II program, this portion of the Pawcatuck River watershed is outside of the regulated area. The Town of Hopkinton is not currently regulated under the Phase II Program.

The Town of Westerly adopted an illicit discharge detection and elimination ordinance in 2008. The Town of Hopkinton does not currently have ordinances 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 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 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 urban stormwater runoff is not the major contributor of bacteria to the Pawcatuck River based on the watershed's imperviousness and as there is not site specific information indicating that runoff from the developed portions of the watershed are contributing to the bacteria impairment, 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 Pawcatuck River 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 Pawcatuck River 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 of Hopkinton should continue to work with the Land Trust to protect more of the undeveloped land in the town, with a focus on lands around the Pawcatuck River. Since 1987, the Westerly Land Trust has acquired 29

significant parcels totaling about 1500 acres of property in the town of Westerly. Many of the properties are locations directly along the Pawcatuck River (Westerly Land Trust, 2013).

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

**Table 1: Pawcatuck River Bacteria Data**

**Waterbody ID:** RI0008039R-18D

**Watershed Planning Area:** 23 – Wood-Pawcatuck

**Characteristics:** Freshwater, Class B1, 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:** 25.5% (Includes 5% Margin of Safety)

**Data:** 2011 from RIDEM ARM Program and TMDL Program

**Single Sample Enterococci (colonies/100 mL) Results for the Pawcatuck River Segment 18D (2011) with Geometric Mean Statistics**

Station Name	Station Location	Sampling Program	Date	Result	Wet/Dry	Geometric Mean
PAW39	Downstream, Route 3 (Main St / Ashaway Rd)	ARM	05/10/11	7.4	Dry	<b>67.9<sup>†</sup></b>
PAW39	Downstream, Route 3 (Main St / Ashaway Rd)	ARM	06/27/11	71.2	Dry	
PAW39	Downstream, Route 3 (Main St / Ashaway Rd)	TMDL	07/07/11	17.2	Dry	
PAW39	Downstream, Route 3 (Main St / Ashaway Rd)	ARM	07/20/11	23.1	Dry	
PAW39	Downstream, Route 3 (Main St / Ashaway Rd)	TMDL	08/03/11	56.6	Dry	
PAW39	Downstream, Route 3 (Main St / Ashaway Rd)	TMDL	08/15/11	1203.31	Wet	
PAW39	Downstream, Route 3 (Main St / Ashaway Rd)	TMDL	08/17/11	517.2	Wet	
PAW39	Downstream, Route 3 (Main St / Ashaway Rd)	ARM	08/18/11	64	Wet	
PAW39	Downstream, Route 3 (Main St / Ashaway Rd)	TMDL	09/13/11	122.3	Dry	
PAW39	Downstream, Route 3 (Main St / Ashaway Rd)	ARM	09/27/11	38.9	Dry	
PAW39	Downstream, Route 3 (Main St / Ashaway Rd)	TMDL	09/28/11	63.1	Dry	
PAW39	Downstream, Route 3 (Main St / Ashaway Rd)	ARM	05/10/11	7.4	Dry	
PAW39	Downstream, Route 3 (Main St / Ashaway Rd)	ARM	06/27/11	71.2	Dry	

Shaded cells indicate an exceedance of water quality criteria

**Wet and Dry Weather Geometric Mean Enterococci Values for all Stations**

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
PAW39	Downstream, Route 3 (Main St / Ashaway Rd)	2011	3	8	67.9	NA	37.1

Shaded cells indicate an exceedance of water quality criteria  
Weather condition determined from rain gage at Westerly Airport in Westerly, RI

### References

- National Resource Conservation Agency (NRCS).  
<http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/eqip/?cid=stelprdb1047761> (accessed February 5, 2013).
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- RIDEM (2010b). State of Rhode Island and Providence Plantations Water Quality Regulations. Amended December, 2010b. Rhode Island Department of Environmental Management.
- RIDEM (2010c). Total Maximum Daily Load Analysis for the Pawcatuck River and Little Narragansett Bay Waters (Bacteria Impairments). Rhode Island Department of Environmental Management.
- RIDEM (2011a). Certificate of Approval for Westerly Community Septic System Loan Program. Letter sent from RIDEM to Westerly on August 19, 2011.
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