Wood River

Watershed Description

This **TMDL** applies to the Wood River assessment unit (RI0008040R-16A), a 6.5-mile long stream segment located in Exeter, Richmond, and Hopkinton, RI (Figure 1). The impaired segment of the Wood River is located in the southern section of the Town of Exeter, and along the border of Richmond and Hopkinton. The Wood River watershed is presented in Figure 2 with land use types indicated.

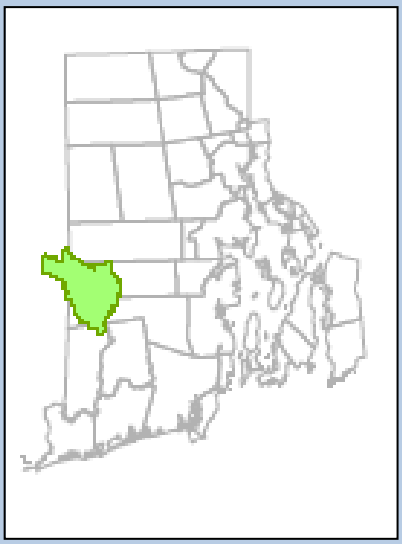
The headwaters of the Wood River begin in a swamp in Sterling, CT. The river flows southeast through Hazard Pond and into West Greenwich, RI. This northern portion of the river is known locally as the Falls River. The Wood River continues southeast through the Arcadia Management Area into the Town of Exeter.

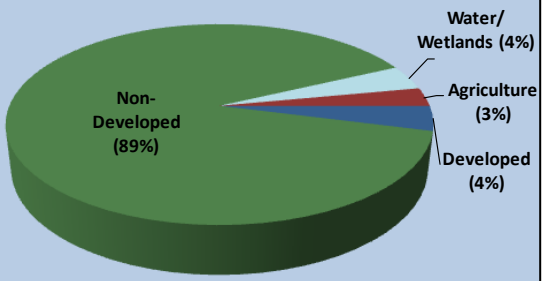
The impaired segment of the Wood River begins just north of Route 165 where the Wood River is joined by the Flat River. The river then flows south through a forested and wetland area along the Richmond-Hopkinton border and empties into Frying Pan Pond which is also fed by Roaring Brook. Another impaired segment of the Wood River begins in Dawley Swamp near Brushy Brook. This segment joins the main stem of the Wood River just before it enters the pond. Once the Wood River leaves the pond, it is no longer considered impaired. It continues south through the Town of Hopkinton and eventually empties into the Pawcatuck River in Charlestown, RI.

The Wood River watershed covers 46 square miles. Non-developed areas occupy a large portion (89%) of the watershed. Developed uses (including residential and commercial uses) occupy approximately 4%. Agricultural land uses occupy 3% and wetlands and other surface waters occupy 4%.

Assessment Unit Facts (RI0008040R-16A)

- **Towns:** Exeter, Richmond, and Hopkinton
- **Impaired Segment Length:** 6.5 miles
- **Classification:** Class A
- **Direct Watershed:** 46 mi^2 (29,495 acres)
- **Impervious Cover:** ~1.6%
- **Watershed Planning Area:** Wood – Pawcatuck (#23)





Watershed Land Uses

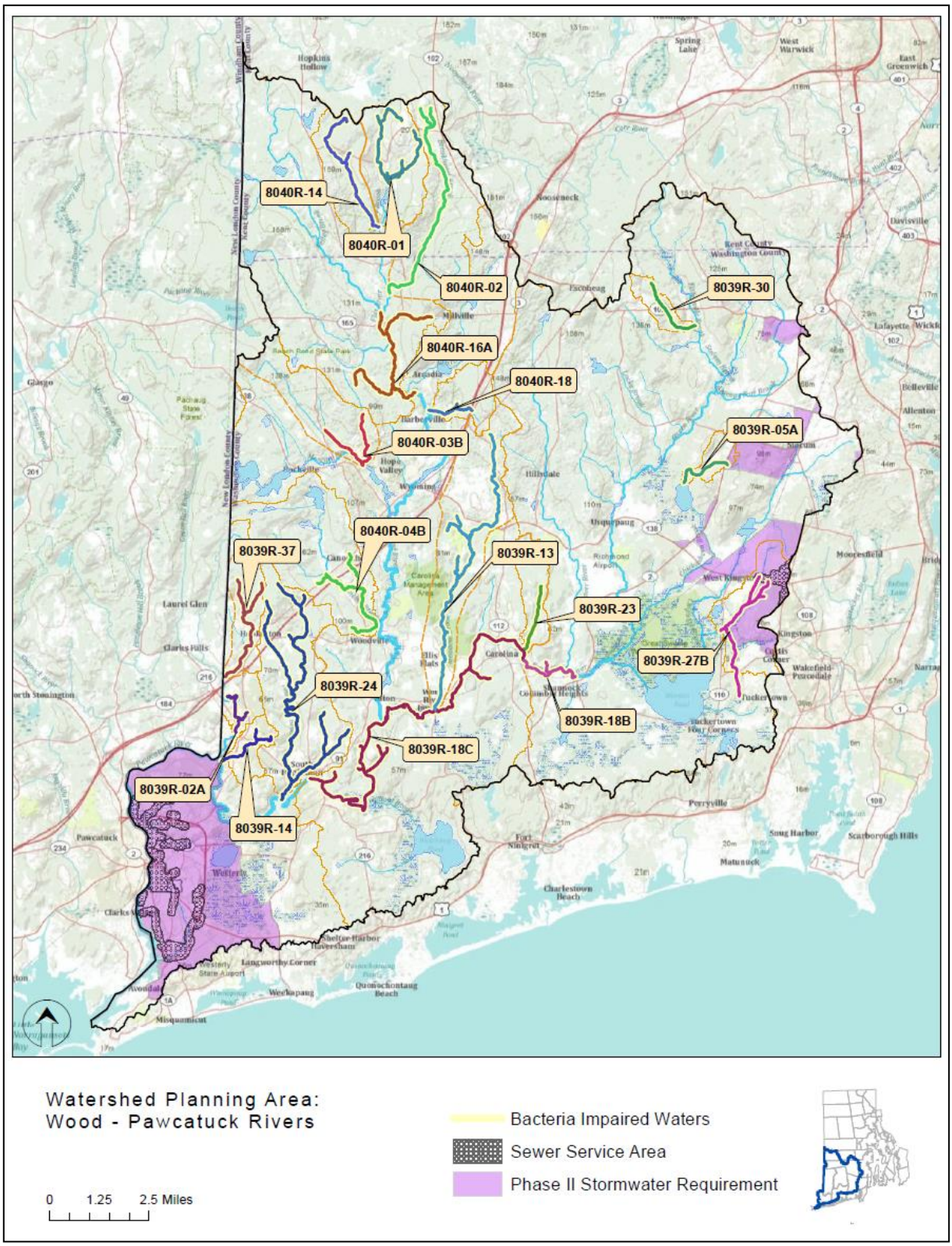


Figure 1: ***Map of the Wood-Pawcatuck Watershed Planning Area with impaired segments addressed by the Statewide Bacteria TMDL, sewered areas, and stormwater regulated zones.***

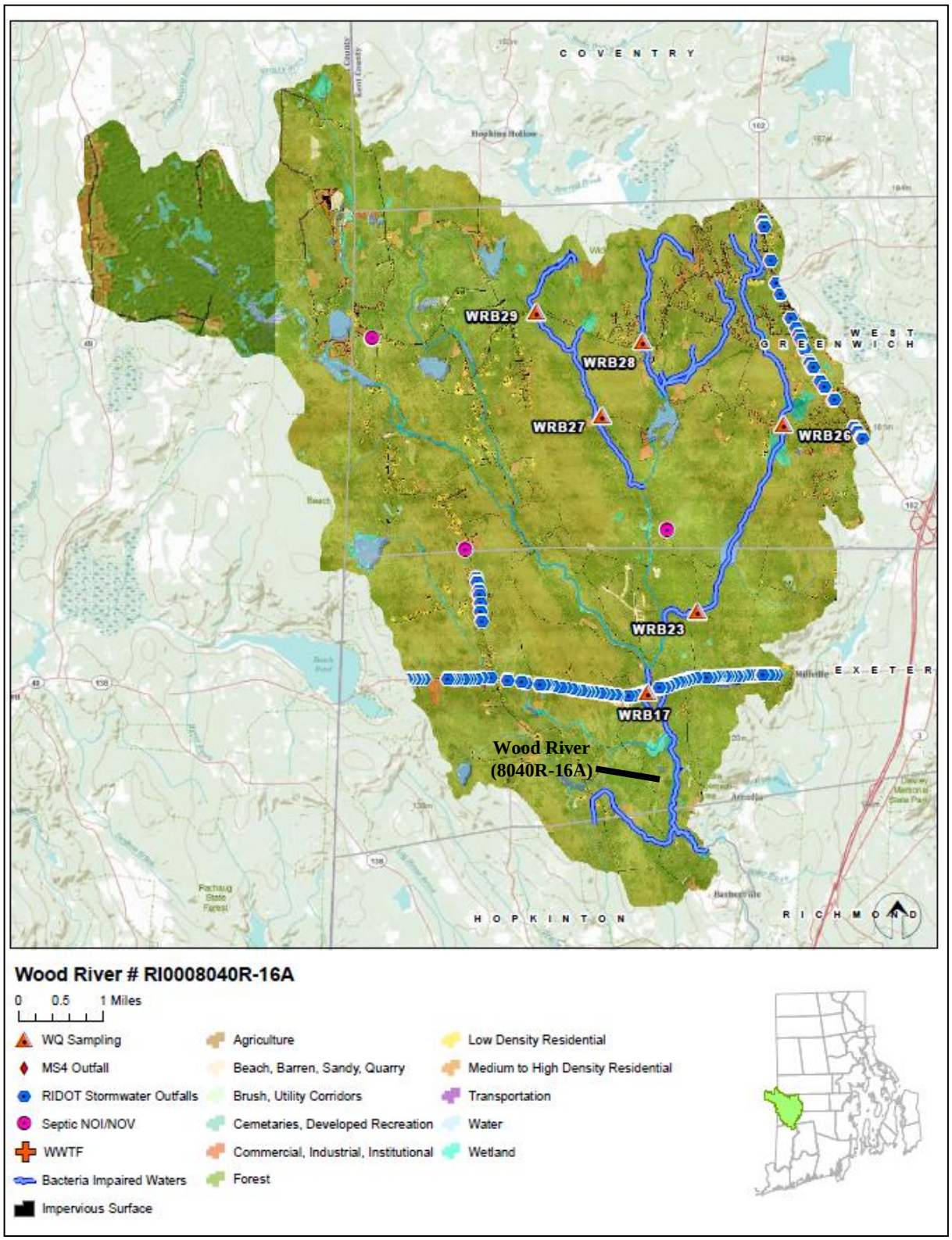


Figure 2: ***Map of the Wood River watershed with impaired segments, sampling locations, and land cover indicated.***

Why is a TMDL Needed?

The Wood River 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). The Wood River is also designated by RIDEM as a Special Resource Protection Water (SRPW), which provides the River with special protections under RIDEM's Antidegradation Provisions. SRPWs are high quality surface waters that include public water supplies and those waterbodies identified as having significant ecological or recreational uses. The Wood River is designated as an SRPW for recreation, critical habitat (rare and endangered species), and as a wild and scenic waterbody.

Figure 3: ***Partial aerial view of the Wood River watershed. (Source: Google Maps)***

In 2004, 2005, and 2008, water samples were collected from one sampling location (WRB17) and analyzed for the indicator bacteria, enterococci. The water quality criteria for enterococci, along with bacteria sampling results from 2004, 2005, and 2008 and associated statistics are presented in Table 1. The geometric mean statistical metric was calculated for station WRB17, and found to exceed the water quality criteria for enterococci. All samples were taken in dry-weather conditions and thus, any exceedance of water quality standards suggests dry-weather sources. Possible dry and wet 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.

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

Potential Bacteria Sources

There are several potential sources of bacteria in the Wood River watershed, including malfunctioning septic systems, agricultural activities, waterfowl and wildlife waste, and stormwater runoff from developed areas.

Onsite Wastewater Treatment Systems

All residents in the Towns of Exeter, Richmond, and Hopkinton and the Wood River 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). Most of the soils in the Town of Exeter have moderate to severe septic system limitations (RIDEM, 2004). As shown in Figure 2, three OWTS Notices of Violation/Notices of Intent to Violate (NOV/NOI) have been issued by the RIDEM Office of Compliance and Inspection in the Wood River watershed.

Waterfowl and Wildlife Waste

Most of the Wood River watershed is non-developed. 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.

Agricultural Activities

Agricultural operations are an important economic activity and landscape feature in the state's rural areas. The Wood River watershed has multiple agricultural operations, including multiple horse and dairy farms in the Town of Richmond (Fuss and O'Neill, 2007). 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.

Developed Area Stormwater Runoff

Only a small portion of the Wood River watershed is developed and most of the development is concentrated along major roads in the watershed. The Wood River watershed has an impervious cover of approximately 1.6%. 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 the Wood 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 within the Towns of Exeter, Richmond, and Hopkinton. As shown in Figure 2, multiple outfalls are found in the Wood River watershed, particularly along Route 165 at the beginning of the impaired segment.

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 Wood 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.

Onsite Wastewater Management

All residents of the Towns of Exeter, Richmond, and Hopkinton and the Wood River watershed rely on OWTS (septic systems or cesspools). All three towns have draft Onsite Wastewater Management Plans that provide a framework for managing the OWTS. As part of the onsite wastewater planning process, the towns 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 develop an initial inventory of OWTS and can track voluntary inspection and pumping programs (RIDEM, 2010b).

The Towns of Exeter, Richmond, and Hopkinton are not currently eligible for Rhode Island's 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 each town develop a program to assist citizens with the replacement of older and failing systems.

Waterfowl and Wildlife Waste

Education and outreach programs should 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. The towns should work with volunteers to map locations where animal waste is a significant and chronic problem. This work should be incorporated into the town's Phase II plans and should result in an evaluation of 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 Wood River. The Wood River'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 Wood 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, may contribute to water quality impairments in Wood River and can harm human health and the environment.

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 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.

Stormwater Management

RIDOT (RIPDES permit RIR040036) is a municipal separate storm sewer (MS4) operator in the Wood River watershed and has prepared a Phase II Stormwater Management Plan (SWMPP) for state-owned roads in the state. Though the Town of Exeter (RIPDES permit RIR040017) is regulated under the Phase II program, the Wood River watershed is located outside of the 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.

The Town of Hopkinton and Richmond are not currently regulated under the Phase II Program. However, it is anticipated that Richmond will be regulated within the next few years. The Town of Richmond has developed an initial Phase II SWMPP in anticipation of Phase II regulations in the future (Fuss and O'Neill, 2007).

Richmond's SWMPP outlines existing stormwater programs and notes goals for these programs in the future. Richmond currently has an annual cleaning and inspection program for its 450 catch basins, and an annual street sweeping program. The town has not mapped or identified their stormwater outfalls or adopted an IDDE ordinance.

The Towns of Exeter, Richmond, and Hopkinton do 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 location be monitored to check for illicit discharges. 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 the Wood River based on the watershed's imperviousness, RIDOT and Exeter 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 Wood River watershed, particularly in the Arcadia Management Area, 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 Wood 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 Wood River. Similar programs could be developed in Exeter and Richmond to protect other portions of the Wood River watershed.

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

Table 1: Wood River Bacteria Data

***Waterbody ID*:** RI0008040R-16A

Watershed Planning Area: 23 – Wood-Pawcatuck

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

Impairment: Enterococci (colonies/100mL)

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

Percent Reduction to meet TMDL: **35% (Includes 5% Margin of Safety)**

Data: 2004, 2005, and 2008 from RIDEM

Single Sample Enterococci (colonies/100 mL) Results for Wood River (2004, 2005, and 2008) with Geometric Mean Statistics

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
WRB17	Wood River-USGS 1117800 in Arcadia Management Area	8/5/2008	166	Dry	**77 (35%)***
WRB17	Wood River-USGS 1117800 in Arcadia Management Area	7/14/2008	184	Dry	
WRB17	Wood River-USGS 1117800 in Arcadia Management Area	7/7/2005	110	Dry	
WRB17	Wood River-USGS 1117800 in Arcadia Management Area	5/5/2005	2	Dry	
WRB17	Wood River-USGS 1117800 in Arcadia Management Area	8/20/2004	390	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 WRB17

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
WRB17	Wood River-USGS 1117800 in Arcadia Management Area	2004-2008	0	5	77	NA	77
Shaded cells indicate and exceedance of water quality criteria Weather condition determined from rain gage at URI in Kingston, RI							

References

Fuss and O'Neill (2007). Stormwater Management Program Plan. Town of Richmond, RI. October 2007.

RIDEM (2004). Total Phosphorus TMDL for Chickasheen Brook, Yawgoo and Barber Ponds. Rhode Island Department of Environmental Services.

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.