



Burnt Swamp Brook

Watershed Description

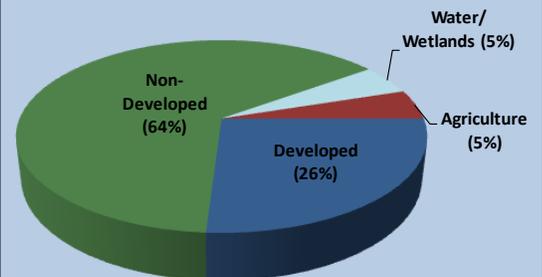
This **TMDL** applies to the Burnt Swamp Brook assessment unit (RI0001006R-06), a 1.3-mile long stream located in Cumberland, RI (Figure 1). The Town of Cumberland is located in the northeastern corner of Rhode Island. Burnt Swamp Brook is located in the northeastern corner of Cumberland, with the stream and northern portion of the watershed extending into Massachusetts. The Burnt Swamp Brook watershed is presented in Figure 2 with land use types indicated.

The majority of the Burnt Swamp Brook watershed is in Massachusetts (approximately 80%). The headwaters of Burnt Swamp Brook originate in a forested area just south of Interstate 495 and west of Summer Street in Sheldonville, Massachusetts. The brook flows south for several miles before passing under MA Route 121 (West Street). The brook continues south through a large wetland area before turning west and passing under Burnt Swamp Road. A tributary then joins the brook shortly before it crosses the State line into Cumberland, Rhode Island. As the brook continues south, it passes under Sumner Brown Road before flowing into several small ponds just north of its entrance into the Diamond Hill Reservoir (a drinking water reservoir) west of Tingley Road in Cumberland (RI Health, 2003). The portion of the brook in Rhode Island is impaired for bacteria.

The Burnt Swamp Brook watershed covers 4.4 square miles. As shown in the aerial image of Figure 3, non-developed lands occupy a large portion (64%) of the watershed. Developed uses (including residential and commercial) cover approximately 26% of the land area. Impervious surfaces cover a total of 7%. Wetland and surface waters occupy 5%, and only a small portion of the watershed (5%) is used for agriculture.

Assessment Unit Facts (RI0001006R-06)

- **Town:** Cumberland
- **Impaired Segment Length:** 1.3 miles
- **Classification:** Class AA
- **Direct Watershed:** 4.4 mi² (2,874 acres)
- **Impervious Cover:** 6.9%
- **Watershed Planning Area:** Branch - Blackstone (#8)



Watershed Land Uses

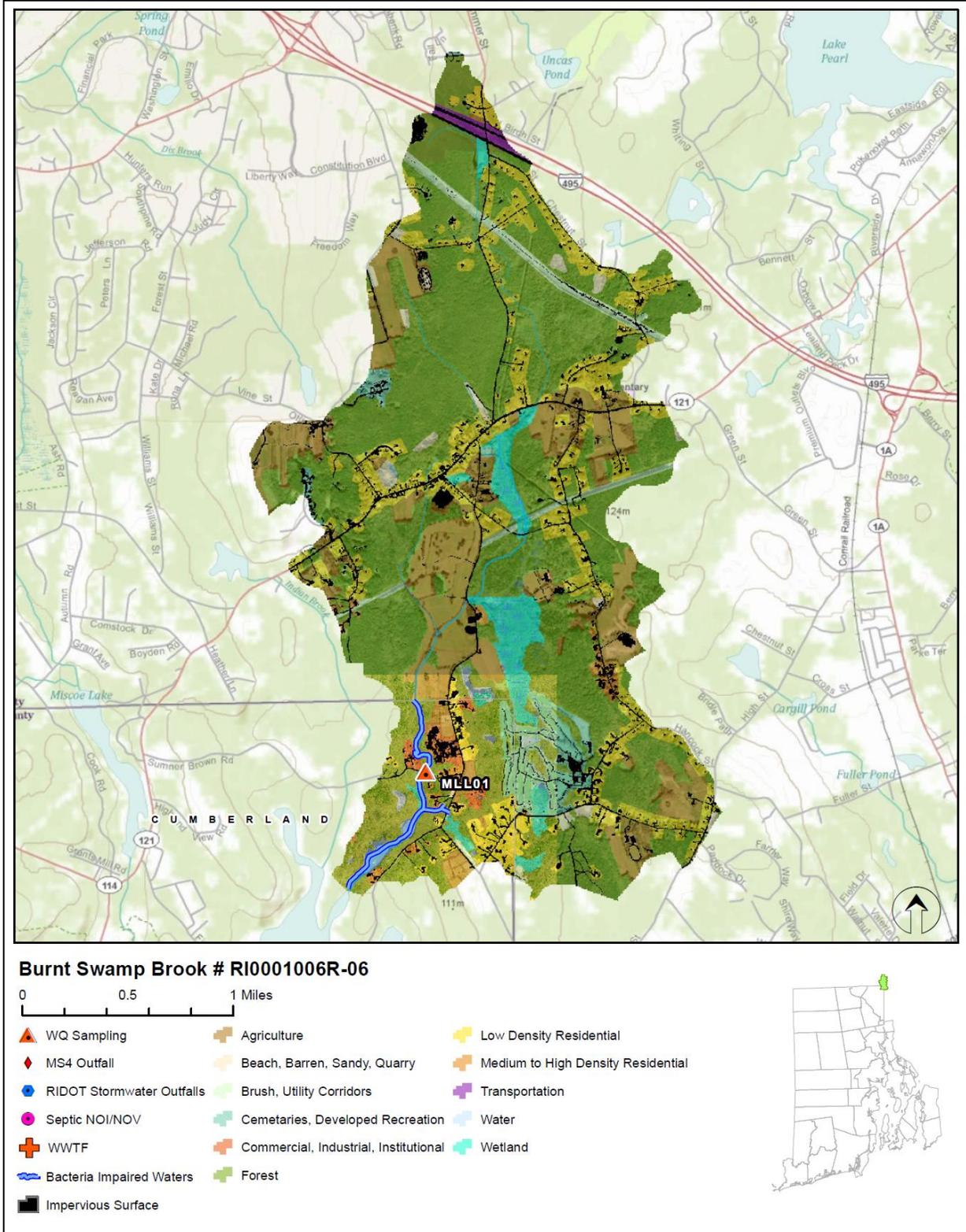


Figure 2: Map of Burnt Swamp Brook watershed with impaired segment, sampling location, and land cover indicated.

Why is a TMDL Needed?

Burnt Swamp Brook is a Class AA fresh water stream and is a tributary within Pawtucket Water Supply Board's 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 2008-2009, water samples were collected at a single sampling location (MLL01) and analyzed for the indicator bacteria, enterococcus. The water quality criteria for enterococcus, along with bacteria sampling results from 2008-2009 and associated statistics are presented in Table 1. The geometric mean was calculated for station MLL01 and exceeded the relevant water quality criteria.

To aid in identifying possible bacteria sources, the geometric mean was also calculated for wet and dry-weather conditions at Station MLL01. Both the wet and dry-weather geometric mean value exceeded the water quality criteria for enterococci, with wet-weather values higher than dry-weather values.

Due to the elevated bacteria measurements presented in Table 1, Burnt Swamp 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 water bodies to comply with state water quality standards.

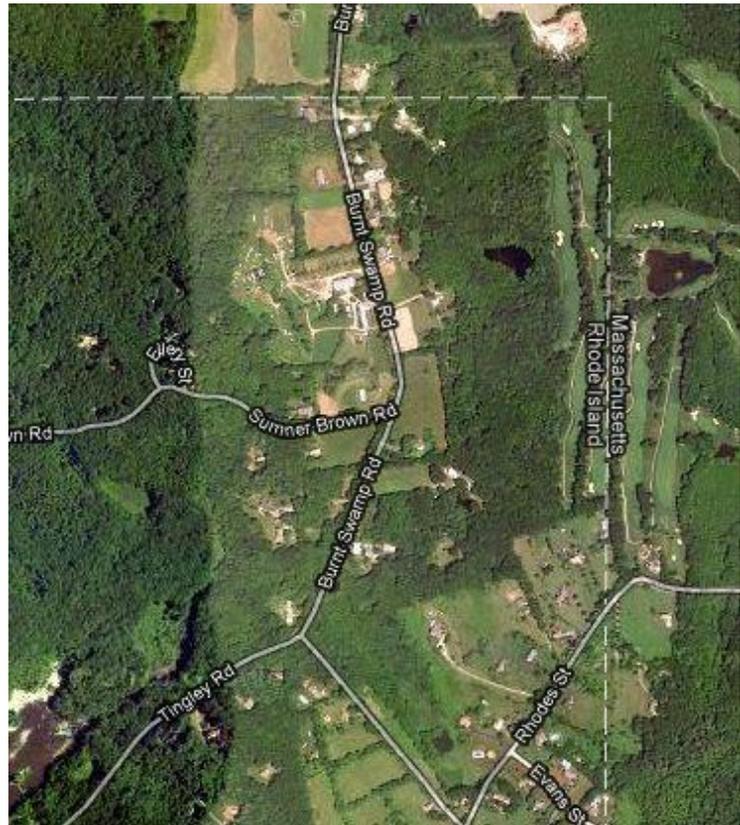


Figure 3: Partial aerial view of the Burnt Swamp Brook watershed. (Source: Google Maps)

Potential Bacteria Sources

There are several potential sources of bacteria in the Burnt Swamp Brook watershed including failing onsite wastewater treatment systems, illicit discharges, wildlife and domestic animal waste, and stormwater runoff from developed areas. These sources exist in both Massachusetts and Rhode Island and cooperation will be required to identify and mitigate bacteria sources.

Onsite Wastewater Treatment Systems

The residents within the Burnt Swamp Brook watershed rely entirely on onsite wastewater treatment systems (OWTS). While nearly half of Cumberland is serviced by a municipal sewer system (Town of Cumberland, 2004), the majority of the Burnt Swamp Brook watershed within Cumberland is undeveloped and does not have access to the municipal sewer system (Figure 1). 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). The soils in much of the Burnt Swamp Brook watershed within Cumberland are not well suited for OWTS due to wetness, flooding potential, slow percolation, and slopes. These soils include Adrian Muck, Canton, and Paxton soil types. Over 30 percent of the town's total land area has soils poorly suited for septic waste disposal (Town of Cumberland, 2003). 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 Rhode Island portions of the Burnt Swamp Brook watershed.

Illicit Discharges

The Town of Cumberland has completed several studies on the feasibility of extending the municipal wastewater system to new areas. As a part of these studies, the need for the development and implementation of town programs aimed at detecting illicit discharges to the town's storm drains, have been highlighted (Town of Cumberland, 2004; Town of Cumberland, 2003).

Developed Area Stormwater Runoff

Approximately 20% of the Burnt Swamp Brook watershed is located within the Town of Cumberland, as most of the watershed extends into Massachusetts. The Burnt Swamp Brook watershed has an impervious cover of 6.9%. 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 developed portions of the watershed may be contributing bacteria to Burnt Swamp 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.

Between 2004 and 2009, Cumberland mapped 80 percent of its stormwater outfalls and catch basins as part of its Phase II requirements (MS4). As the Burnt Swamp Brook watershed is outside the regulated areas in Cumberland, it is not known if outfalls exist in this area. Burnt Swamp Brook may also receive significant amounts of stormwater from ditching along roads and development within Cumberland, and from outfalls in Sheldonville, MA.

Wildlife and Domestic Animal Waste

Domestic animals within the Burnt Swamp Brook watershed represent a potential source of bacteria. Residential developments, and therefore pets, are located directly adjacent to the stream in several areas within Cumberland, RI and Sheldonville, MA. Proper pet waste management is important to ensure this potential source of bacteria is minimized.

Large sections of the Burnt Swamp Brook watershed consist of wetland areas and small surface water ponds. These areas provide ideal habitat for and are frequented by wildlife, especially waterfowl (Wrentham Conservation Commission, 2003). The stream flows alongside or directly through many of these areas (Figure 2), concentrating wildlife and waterfowl around Burnt Swamp Brook. 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.

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 Burnt Swamp Brook watershed. These activities could include sampling at several different locations and under different weather conditions (e.g., wet and dry). An area of the watershed that should be targeted in future bacteria sampling is the large section of Burnt Swamp Brook that flows south from Massachusetts. Coordinating with officials from Massachusetts to share data and set up new sampling locations is essential to support identifying and mitigating sources of bacteria throughout Burnt Swamp Brook. Field reconnaissance surveys focusing on stream buffers, stormwater runoff, and other source identification would also be beneficial.

Cumberland should also work with the Town of Wrentham, MA, to generate and share data pertaining to potential pollution sources, such as OWTS, illicit discharges, and animal waste, as well as broader management issues, such as stormwater management and land use protection. The towns could work

together to coordinate the development of an Onsite Wastewater Management Plan, septic system and illicit discharge ordinances, as well as citizen education and outreach. Greater collaboration and commitment among towns located in the watershed will enhance the long term protection of drinking water reservoirs within Cumberland.

Based on existing ordinances and previous investigations, the following steps are recommended to support water quality goals.

Onsite Wastewater Management

All residents within the Burnt Swamp Brook watershed within Cumberland rely on OWTS. Currently, the Town of Cumberland does not have an Onsite Wastewater Management Plan or an OWTS ordinance. As part of onsite wastewater management, Cumberland should 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).

The Town of Cumberland 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 Cumberland develop a program to assist citizens with the replacement of older and failing systems.

Wildlife and Domestic Animal Waste

Cumberland's education and outreach programs should highlight the importance of picking up after dogs and other pets and not feeding waterfowl, particularly around the small ponds and wetlands within the Burnt Swamp Brook watershed. Animal wastes should be disposed of away from any waterway or stormwater system. Cumberland should work with volunteers from the town to map locations where animal waste is a significant and chronic problem. This work should be incorporated into the municipality'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 also take several measures to minimize waterfowl-related impacts. These measures may include allowing tall, coarse vegetation to grow in areas along the shores of the numerous

small ponds along Burnt Swamp Brook and its tributaries. These ponds, as well as much of the wetland areas within the watershed are frequented by waterfowl (Wrentham Conservation Commission, 2003). 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 Burnt Swamp 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 Burnt Swamp Brook watershed and has prepared a Phase II Stormwater Management Plan (SWMPP) for state-owned roads throughout the State. Though the Town of Cumberland (RIPDES permit RIR040035) is regulated by the Phase II program, the Burnt Swamp Brook watershed is outside of the Phase II regulated area.

Currently, Cumberland does not have an illicit discharge detection and elimination ordinance. These types of ordinances prohibit illicit discharges to the MS4 and provide an enforcement mechanism. The town should develop and implement an illicit discharge detection and elimination ordinance. This could also be done in collaboration with Sheldonville, MA. In Cumberland's Comprehensive Plan, Action NR.1.3.3. proposes the establishment of a Wastewater Management District (WWMD) within the Cumberland and Pawtucket Reservoir Watershed, which includes Burnt Swamp Brook (Town of Cumberland, 2004). Having an active WWMD would help establish and enforce any future illicit discharge detection and elimination ordinance. In the past, the Cumberland Department of Public Works has identified illicit discharges through routine catch basin cleaning. In these cases, Cumberland notified RIDEM for enforcement (Town of Cumberland, 2003). These discharges can be a significant source of bacterial contamination, and Cumberland should have more thorough measures in place for detection. Illicit discharges can be more clearly 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 Burnt Swamp Brook based on the watershed's imperviousness, RIDOT and Cumberland 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

Currently, the Burnt Swamp Brook watershed is approximately 64% undeveloped, however only a small portion of this area is protected as open space. As source waters to Pawtucket's water supply system preserving the watershed's natural areas is particularly important. The Burnt Swamp Brook watershed currently has several conservation areas consisting of important woodland and wetland areas. The largest of these areas (41 acres) is located east of Burnt Swamp Road and South of Hancock Street, in Sheldonville, MA. Within the Town of Cumberland's Comprehensive Plan, specific policies were proposed to preserve unique natural areas through land acquisition, conservation easements, transfer of development rights, and other creative methods to limit development (Town of Cumberland, 2004).

Preserving these natural areas is important because woodland and wetland areas within the Burnt Swamp Brook watershed absorb and filter pollutants from stormwater, and help protect both water quality in the stream and stream channel stability. As these areas represent approximately two-thirds of the land use in the Burnt Swamp Brook watershed, it is important to conserve them, and manage development in the watershed.

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

Table 1: Burnt Swamp Brook Bacteria Data

Waterbody ID: RI0001006R-06

Watershed Planning Area: 8 – Branch - Blackstone

Characteristics: Freshwater, Class AA, Tributary within a Public Drinking 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: 84% (Includes 5% Margin of Safety)

Data: 2008-2009 from RIDEM

Single Sample Enterococci (colonies/100 mL) Results for Burnt Swamp Brook (2008-2009) with the Geometric Mean

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
MLL01	Burnt Swamp Brook ON Sumner Brown Road (off of 121 in Cumberland)	8/18/2009	548	Dry	258 (84%)*
MLL01	Burnt Swamp Brook ON Sumner Brown Road (off of 121 in Cumberland)	8/5/2009	361	Wet	
MLL01	Burnt Swamp Brook ON Sumner Brown Road (off of 121 in Cumberland)	7/7/2009	980	Wet	
MLL01	Burnt Swamp Brook ON Sumner Brown Road (off of 121 in Cumberland)	5/13/2009	112	Dry	
MLL01	Burnt Swamp Brook ON Sumner Brown Road (off of 121 in Cumberland)	9/22/2008	53	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 MLL01

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
MLL01	Burnt Swamp Brook, Sumner Brown Road (off of 121 in Cumberland)	2008-2009	2	3	258	595	148
Shaded cells indicate an exceedance of water quality criteria Weather condition determined from Weather Underground rain gage in Lincoln, RI							

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