Final Massachusetts Statewide Total Maximum Daily Load for Pathogen-Impaired Waterbodies

Appendix I: French River Basin

Commonwealth of Massachusetts
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Available Online

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Massachusetts Department of Environmental Protection

The mission of the Massachusetts Department of Environmental Protection (MassDEP) is to protect and enhance the Commonwealth's natural resources – air, water, and land – to provide for the health, safety, and welfare of all people, and to ensure a clean and safe environment for future generations. In carrying out this mission MassDEP commits to address and advance environmental justice and equity for all people of the Commonwealth; provide meaningful, inclusive opportunities for people to participate in agency decisions that affect their lives; and ensure a diverse workforce that reflects the communities we serve.

Watershed Planning Program

The mission of the Watershed Planning Program (WPP) in the Massachusetts Department of Environmental Protection is to protect, enhance, and restore the quality and value of the waters of the Commonwealth. Guided by the federal Clean Water Act, WPP implements this mission statewide through five Sections that each have a different technical focus: (1) Surface Water Quality Standards; (2) Surface Water Quality Monitoring; (3) Data Management and Water Quality Assessment; (4) Total Maximum Daily Load; and (5) Nonpoint Source Management. Together with other MassDEP programs and state environmental agencies, WPP shares in the duty and responsibility to secure the environmental, recreational, and public health benefits of clean water for all people of the Commonwealth.

Acknowledgements

FB Environmental Associates, under contractual agreements with MassDEP, previously prepared two separate documents for the Watershed Planning Program: (1) *Massachusetts TMDL for Pathogen-Impaired Inland Fresh Water Rivers* and (2) *Massachusetts Statewide TMDL for Pathogen-Impaired Coastal Waterbodies*. MassDEP combined these two documents into a single statewide approach encompassing both inland fresh water and coastal impairments to prepare the *Final Massachusetts Statewide Total Maximum Daily Load for Pathogen-Impaired Waterbodies*.

Disclaimer

References to trade names, commercial products, manufacturers, or distributors in this report constituted neither endorsement nor recommendations by the Massachusetts Department of Environmental Protection.

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TABLE OF CONTENTS

1. Introduction

This appendix to the Massachusetts Statewide Total Maximum Daily Load (TMDL) for Pathogen-Impaired Waterbodies provides additional information to support the determination of the Total Maximum Daily Load (TMDL) for four pathogen-impaired river segments in the French River watershed (Figure 1-1). The core document and appendix together complete the TMDL for each of these pathogen-impaired river segments.

This appendix includes a description of the watershed and maps to identify the segments of focus for the TMDLs; the impaired uses, and the water classification and qualifiers as designated by the Massachusetts Surface Water Quality Standards (SWQS, 314 CMR 4.00); the water quality standards applicable to the impaired uses; the data supporting the pathogen impairment determination; and a description of the sources of pathogen loading with supporting maps. For water quality data, the Method Detection Limit (MDL) is reported and used for values below the MDL when calculating geometric means.

This appendix includes a summary of the allocation of the current indicator bacteria load into two categories: point sources (waste load allocation, WLA) and nonpoint sources (load allocation, LA), based on an analysis of watershed percent impervious cover. This appendix also identifies the percent reduction in indicator bacteria pollutant load from current conditions required to meet the TMDL, based on the highest levels of indicator bacteria recorded in the monitoring data. Refer to Tables 1-1 and 1-2.

Finally, for each impaired segment, this appendix presents existing local management efforts to reduce pathogen pollutant loading. General recommended next steps for implementation of this TMDL are provided in the French River Watershed Overview section.

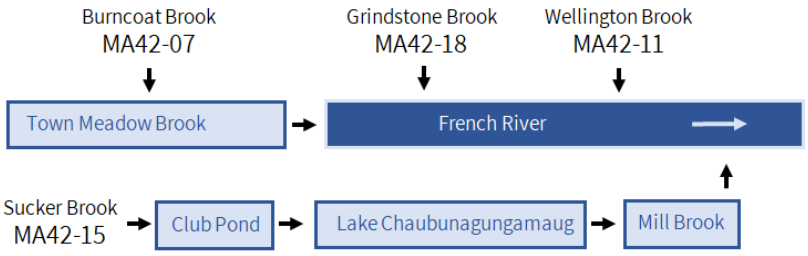


Figure 1-1. Conceptual diagram of water flow routing through the French River watershed for the 4 pathogen-impaired river segments. Major tributaries and lakes/ponds (i.e., Town Meadow Brook, Club Pond, etc.) are highlighted in light blue, while the mainstem French River is highlighted in dark blue. Impaired tributary segments to the major waterbodies are shown in black with arrows. Not to scale.

Table 1-1. ***E. Coli*** Total Maximum Daily Loads (TMDLs), the percent reductions needed to meet the TMDL target (126 CFU/100ml) based on the Massachusetts Surface Water Quality Standards (SWQS), and the flow-based TMDL allocations for pathogen-impaired **freshwater** assessment units in the French River Basin

Waterbody & Assessment Unit	Class (Qualifier)	TMDL Type	SWQS-Based TMDL target (CFU/100ml)	Maximum Geomean (CFU/100ml)	Geomean Percent Reduction	TMDL Allocation	*Flow (cfs)* 1	10	100	1,000	10,000	100,000
							Flow-Based Target TMDL (CFU/day*10^9)					
Burncoat Brook		R	126	NA	-	WLA (4%)	0.1	1.4	13.7	136.7	1,366.9	13,669.5
MA42-07	B					LA (96%)	2.9	29.5	294.6	2,946.0	29,459.9	294,598.6
Wellington Brook		R	126	866	85%	WLA (8%)	0.3	2.6	25.9	258.7	2,586.5	25,865.2
MA42-11	B			(90 day)		LA (92%)	2.8	28.2	282.4	2,824.0	28,240.3	282,402.8
Sucker Brook		R	126	NA	-	WLA (7%)	0.2	2.1	21.3	212.6	2,125.7	21,257.4
MA42-15	B					LA (93%)	2.9	28.7	287.0	2,870.1	28,701.1	287,010.6
Grindstone Brook		R	126	NA	-	WLA (7%)	0.2	2.1	21.4	214.3	2,142.7	21,426.9
MA42-18	B					LA (93%)	2.9	28.7	286.8	2,868.4	28,684.1	286,841.1

Table 1-2. **Enterococci** Total Maximum Daily Loads, the percent reductions needed to meet the TMDL target (35 CFU/100ml) based on the Massachusetts Surface Water Quality Standards (SWQS), and the flow-based TMDL allocations for pathogen-impaired **freshwater** assessment units in the French River Basin

Waterbody & Assessment Unit	Class (Qualifier)	TMDL Type	SWQS-Based TMDL target (CFU/100ml)	Maximum Geomean (CFU/100ml)	Geomean Percent Reduction	TMDL Allocation	*Flow (cfs)* 1	10	100	1,000	10,000	100,000
							Flow-Based Target TMDL (CFU/day*10^9)					
Burncoat Brook		P	35	NA	-	WLA (4%)	-	0.4	3.8	38.0	379.7	3,797.1
MA42-07	B					LA (96%)	0.8	8.2	81.8	818.3	8,183.3	81,832.9
Wellington Brook		P	35	NA	-	WLA (8%)	0.1	0.7	7.2	71.8	718.5	7,184.8
MA42-11	B					LA (92%)	0.8	7.8	78.4	784.5	7,844.5	78,445.2
Sucker Brook		P	35	NA	-	WLA (7%)	0.1	0.6	5.9	59.0	590.5	5,904.8
MA42-15	B					LA (93%)	0.8	8.0	79.7	797.3	7,972.5	79,725.2
Grindstone Brook		P	35	NA	-	WLA (7%)	0.1	0.6	6.0	59.5	595.2	5,951.9
MA42-18	B					LA (93%)	0.8	8.0	79.7	796.8	7,967.8	79,678.1

Class *defined in the Massachusetts Surface Water Quality Standards (SWQS) at 314 CMR 4.02.*
Qualifiers *that identify segments with special characteristics are defined at 314 CMR 4.06(1)(d).*
Pathogen bacteria units are presented in colony-forming units or CFU per 100 milliliter or ml.
TMDL Type *identifies the restorative or protective action approach:*
- ***R*** *= Restorative TMDL addressing a pathogen impairment identified in the 2018/2020 Integrated List of Waters*
- ***R**** *= Restorative TMDL addressing a historic impairment of former indicator bacteria for which no current applicable criteria are available See Section 2.3 of the core document for summary of water quality criteria and designated uses.*
- ***P*** *= Protective TMDL addressing all applicable uses, regardless of impairment status, for the associated pathogen (refer to the Massachusetts SWQS: 314 CMR 4.00)*

Target TMDL or Total Maximum Daily Load is presented as both SWQS-Based and Flow-Based.
- ***SWQS-Based TMDL Target*** *is the target concentration applicable to the TMDL pollutant indicator bacteria based on the Surface Water Quality Standards (314 CMR 4.00).*
- ***Flow-Based Target TMDL*** *is the target concentration (CFU/100mL) multiplied by the standard flow volume (cubic feet per second or cfs). See Section 4.2.2 in core document for full equation and conversion factors.*

Maximum Geomean *is the highest calculated 30- or 90- day rolling geometric mean for TMDL pollutant indicator bacteria associated with the segment.*
Geomean Percent Reduction *is the percent reduction from the highest calculated 30- or 90- day rolling geomean needed to achieve the target concentration. Percent reductions are for planning purposes only.*

2. French River Watershed Overview

The French River watershed covers an area of approximately 95 square miles in south central Massachusetts (Figure 2-1). Overall, the watershed includes 15 named rivers, approximately 35 named river miles; many smaller unnamed rivers; and 68 lakes, ponds, and impoundments (MassDEP, 2009). There are four pathogen-impaired segments in the French River watershed.

The French River begins at the outlet of Greenville Pond in Leicester, MA and flows generally south for 26 miles to end at its confluence with the Quinebaug River in Thompson, CT (MassDEP, 2009). The river course is altered by a dry-bed flood control reservoir, part of the Army Corps Hodges Village Project. The watershed also contains the largest natural freshwater lake in Massachusetts (and longest lake name on record), Lake Chargoggagogmanchauggagoggchaubunagungamaugg a.k.a., Webster Lake (MassDEP, 2009). The French River has several impoundments, including Rochdale, Texas, and Perryville ponds, as well as an unnamed impoundment upstream of North Village, Webster (MassDEP, 2016).

Little River is a major tributary to the French River and flows generally south from Spencer, MA to its confluence with the French River in Oxford, MA. The river course has been altered by the Buffumville Army Corps Flood Control Project which created Buffumville Lake, a large (186-acre) impoundment of the Little River used for recreational purposes (MassDEP, 2009). There are no pathogen-impaired segments in the Little River watershed.

The French River watershed overlaps at least partially with 10 municipalities. Of these, six were identified as being direct sources of pathogen loading to the impaired river segments in this TMDL. The efforts of these municipalities to address pollutant loading are described in the segment-specific sections below. For each segment, the cities and towns that contain or border the impaired segment were identified. Towns comprising more than 10% of the impaired stream segment's sub-basin (that portion of its watershed not shared with upstream segments) were also included. See Figure 2-1 for a map showing impaired segments and municipalities.

Many municipalities operate and maintain municipal separate storm sewer systems (MS4s) in urban areas. These networks of drains and pipes convey polluted runoff from streets and developed areas to streams. In addition, these networks are sometimes subject to direct wastewater inflows through illegal cross-connections, leaks from sewer pipes or septic systems, dumping, or other unauthorized wastewater sources, and together these sources are termed illicit discharges.

EPA and MassDEP jointly issued the General Permits for Stormwater Discharges from MS4s, which became effective July 1, 2018. Communities that discharge to pathogen-impaired waterbodies with approved TMDLs are required to implement enhanced best management practices (BMPs) for public education and designate the catchments as Problem Catchments or High Priority under the Illicit Discharge Detection and Elimination (IDDE) Program, in addition to the requirement to reduce pollutants to the Maximum Extent Practicable (USEPA 2016; Appendix F).

In addition to municipalities, there is one Regional Planning Agencies (RPA) in the French River watershed. These are public organizations advising municipalities, private business groups, and state and federal governments on a range of matters. Their research, coordination, and technical assistance is especially valuable on watershed issues such as pathogen pollutants and stormwater that cross town boundaries.

- Central Massachusetts Regional Planning Commission (CMRPC), http://www.cmrpc.org/ (CMRPC, 2020)

The following RPA initiatives and tools are especially noteworthy:

- There are regional stormwater coalitions within some RPAs, and these are noted in the segment-specific sections below.
- The CMRPC offers local technical assistance to municipalities within their jurisdiction, can aid in the creation of master plans, new zoning bylaws, green energy technical assistance, and GIS mapping.

Beyond these activities, the Massachusetts Statewide Municipal Stormwater Coalition (MSMSC), composed of about 10 stormwater groups around the state, further coordinates with and assists municipalities on pathogen pollutant concerns in the "Think Blue" campaign (Think Blue Massachusetts, 2019).

Additional watershed scale initiatives are carried out by several organizations including:

The **French River Connection** is a non-profit membership organization which strives to preserve and revitalize the French River in Webster, Dudley, and Oxford https://www.frenchriverconnection.org/ (FRC, 2020).

The **Webster Lake Association** helps protect the ecological health of Webster Lake through invasive plant management, water quality testing, and outreach projects https://websterlakeassociation.org/ (WLA, 2020).

The following actions will help reduce pathogen loads to the streams. The list is a starting point and is not comprehensive. For a more detailed discussion of pollutant reduction actions, see Section 5 "Implementation" of the core TMDL document.

- Collect additional water quality data for all segments for which existing data are older than five years.
- **Municipalities:** Continue to implement requirements of the MS4 permit, which includes specific requirements for waterbodies with an approved Bacteria/Pathogen TMDL, such as prioritization and reporting, enhanced BMPs, IDDE work, and education (USEPA, 2020).
- **Regional Planning Agencies (RPAs) and municipalities:** Continue and expand collaboration on MS4 and stormwater issues. Cooperatively developing tools and sharing knowledge has many advantages, including reduced costs, increased innovation, and more consistent and effective stream restoration efforts at the watershed scale.
    - Two tools developed by Metropolitan Area Planning Council (MAPC) are potentially valuable in all MS4 communities in the state. Municipalities and other RPAs (with permission from MAPC) should consider adapting and/or expanding on these tools in their area:
        - Stormwater Utility/Funding Starting Kit (MAPC, 2014).
        - MAPC and the Neponset River Watershed Association created a GIS toolkit to calculate MS4 outfall catchments, which is a requirement under the MS4 General Permit (MAPC, 2018).
- **USDA NRCS and landowners:** Develop comprehensive nutrient management plans for agriculture, using local connections to farmers for outreach.
- **Parks departments, schools, private landowners, and others** who maintain large, mowed fields with direct access to water should consider maintaining a vegetative buffer along the water's edge. Buffers slow and filter stormwater runoff, provide a visual screen that can reduce large aggregations of waterfowl, and have many other water quality benefits at low cost.

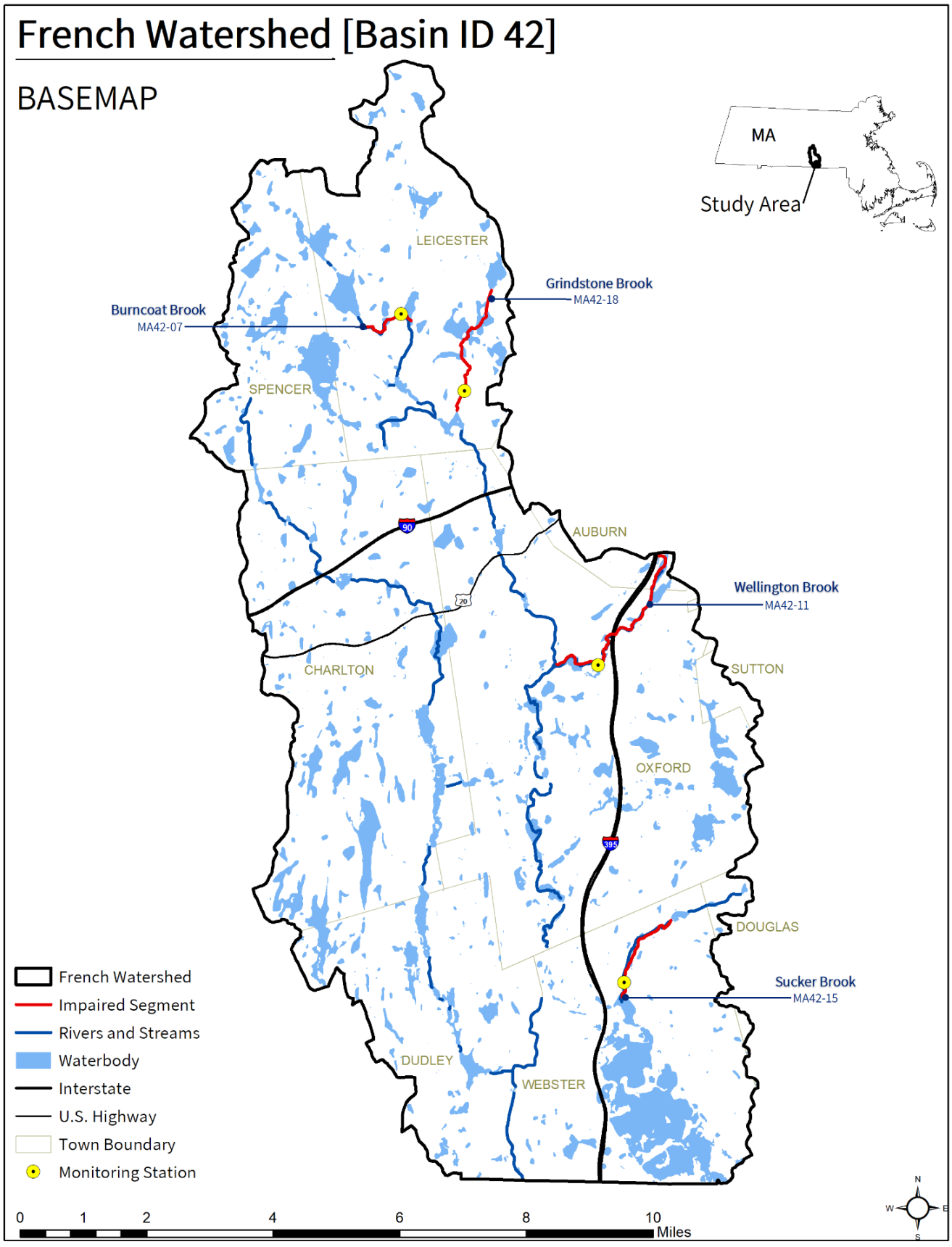


Figure 2-1: Map of all pathogen-impaired river segments, water quality monitoring stations, municipal borders, waterbodies, and roads in the French watershed.

3. MA42-07 Burncoat Brook

3.1. Waterbody Overview

The Burncoat Brook segment MA42-07 is 1.0 mile long and begins at the outlet of Bouchard Pond in Leicester, MA. The segment flows east through Ballard Hill Pond (formerly pond segment MA42069), then ends at its confluence with Town Meadow Brook in Leicester.

Burncoat Brook has one unnamed tributary. Named lakes and ponds in the watershed include Burncoat Pond, Cedar Meadow Pond, and Bouchard Pond. Key landmarks in the watershed include Sibley Farm and Mass Audubon Burncoat Pond Wildlife Sanctuary. The segment is only crossed by Pine Street in Leicester, 0.02 miles downstream of the start of the segment.

Burncoat Brook (MA42-07) drains an area of 4.5 square miles, of which 0.2 mi^2 (4%) is impervious and 0.1 mi^2 (1%) is directly connected impervious area (DCIA). The watershed is partially[1] served by public sewer and 97% is subject to stormwater regulations under the NPDES General MS4 Stormwater Permit (USEPA, 2020). There are no NPDES permits on file governing point source discharges of pollutants to surface waters and no MassDEP discharge to groundwater permits for on-site wastewater discharge within the watershed. There are also no combined sewer overflows, no landfills, and no unpermitted land disposal dumping grounds within the watershed. See Figure 3-1.

The Burncoat Brook watershed is predominantly forested (62%), with moderate areas of developed (12%) and agricultural (8%) land uses. Development consists of low to medium density mixed residential and commercial and is scattered evenly throughout the watershed, though somewhat concentrated around Cedar Meadow Pond, upstream of the segment. The segment itself flows through large, wooded buffer areas. Agriculture lands are mostly in the upper watershed and consist of hayfields and row crops.

In the Burncoat Brook (MA42-07) watershed, under the Natural Heritage and Endangered Species Program, there are 175 acres (6%) of Priority Habitats of Rare Species. There are no

Reduction from Highest Calculated Geomean: NA

Watershed Area (Acres): 2,868

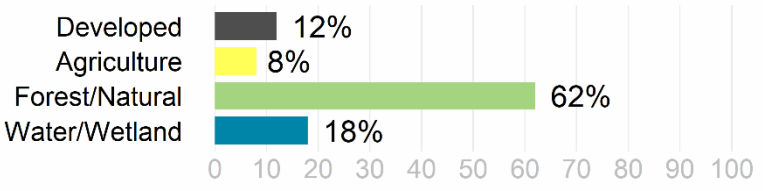
Segment Length (Miles): 1.0

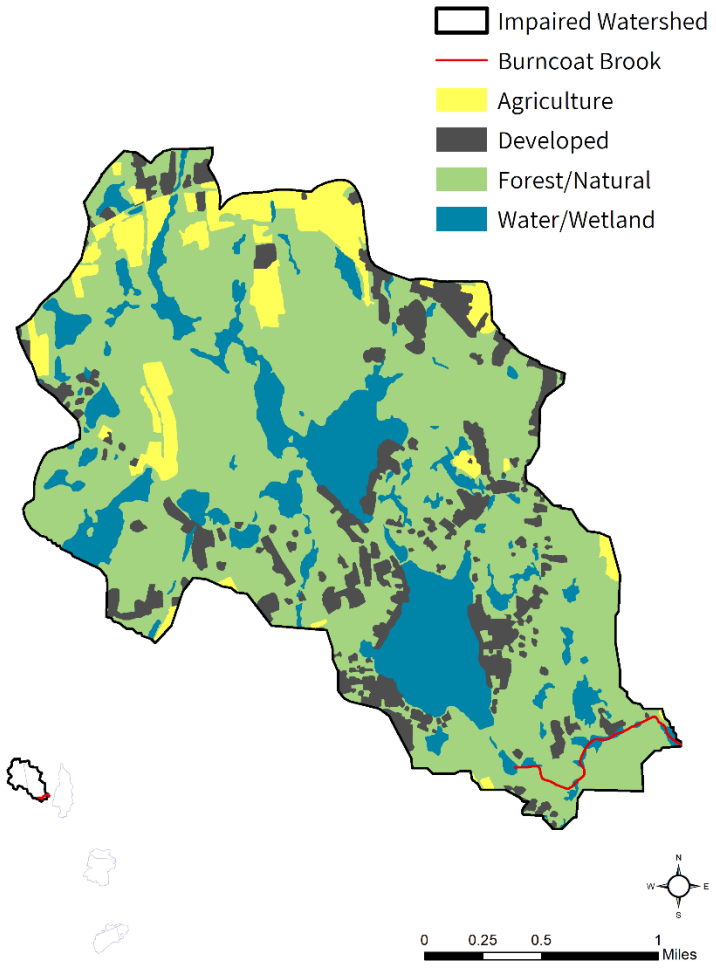
Impairment(s): *E. coli* (Primary Contact Recreation)

Class (Qualifiers): B

Impervious Area (Acres, %): 127 (4%)

DCIA Area (Acres, %): 42 (1%)





[1] Estimated percentage of developed areas with wastewater infrastructure in the watershed was based on available information: MWRA service areas, MassDEP's Water Utility Infrastructure Mapping Project https://www.mass.gov/guides/water-utility-resilience-program (MassDEP 2020), MS4 reports, and local knowledge.

Areas of Critical Environmental Concern, no areas under Public Water Supply protection, and no areas identified as Outstanding Resource Waters in the watershed. Over 429 acres (15%) of land protected in perpetuity[2] exist within the segment watershed, which is part of a total of 730 acres (25%) of Protected and Recreational Open Space[3]. See Figure 3-1.

[2] Land protected in perpetuity include several interests such as conservation restriction, agricultural preservation, private deed restrictions, wetland restrictions, aquifer protection, historic preservation, etc. Refer to Mass GIS metadata for the Protected and Recreational Open Space data layer.

[3] Only land protected in perpetuity is shown on the natural resources map. Protected and Recreational Open Space estimates reflect areas in the State of Massachusetts only (and thus reflect only a portion of the total open space for watersheds that extend outside the State of Massachusetts).

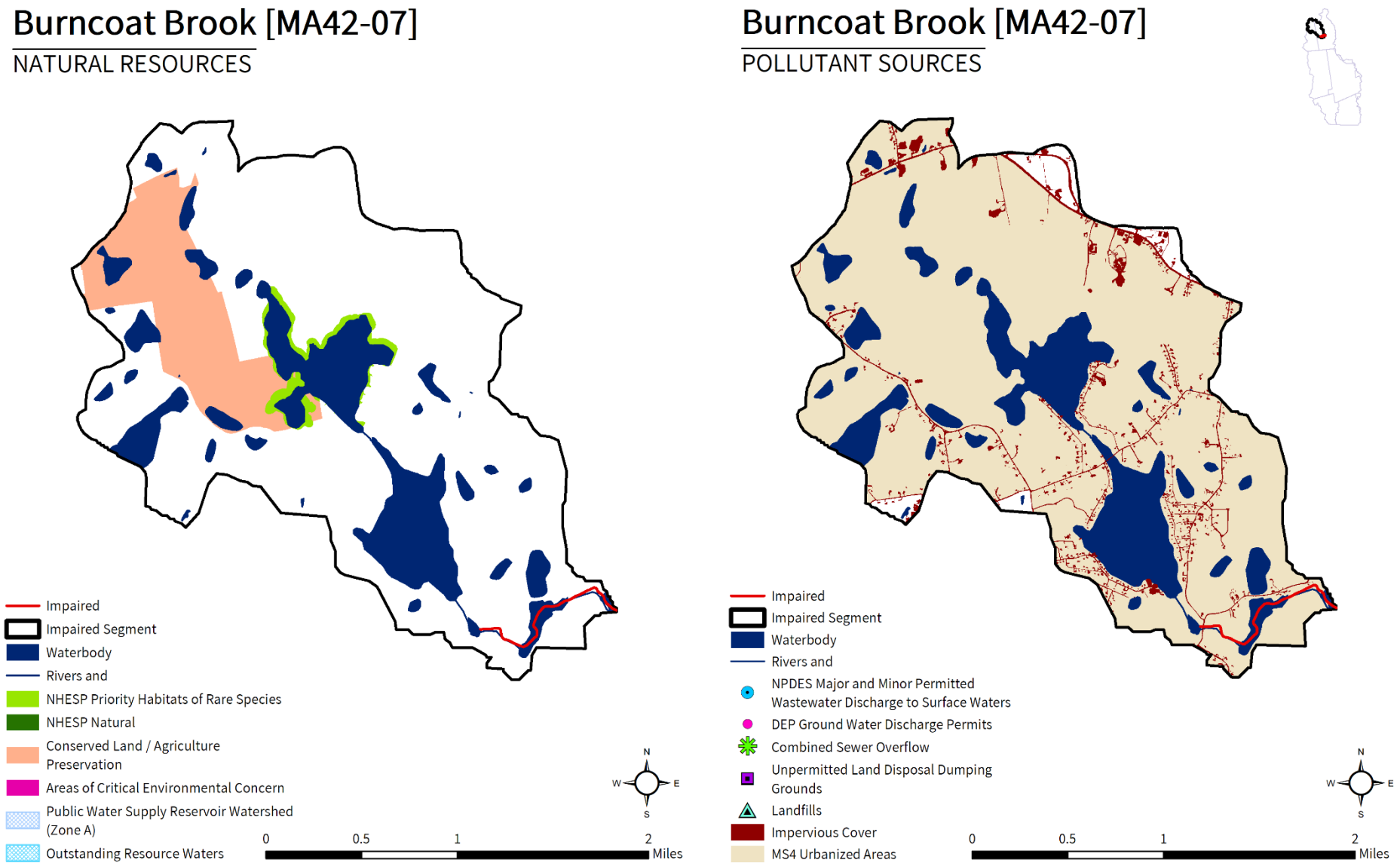


Figure 3-1. Natural resources and potential pollution sources draining to the Burncoat Brook segment MA42-07. The map on the left shows critical habitat, water features, and conserved land. The map on the right indicates potential and known pollution sources, including impervious cover, MS4 areas, and permitted facilities.

3.2. Waterbody Impairment Characterization

Burncoat Brook (MA42-07) is a Class B Water (MassDEP, 2021).

The impairment decision was carried forward from the *2004-2008 Water Quality Assessment Report* (MassDEP, 2009). MassDEP collected fecal coliform and *E. coli* from Burncoat Brook (Station W1164) in Leicester on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 214 CFU/100mL and did not meet the criteria for Primary Contact Recreation use.

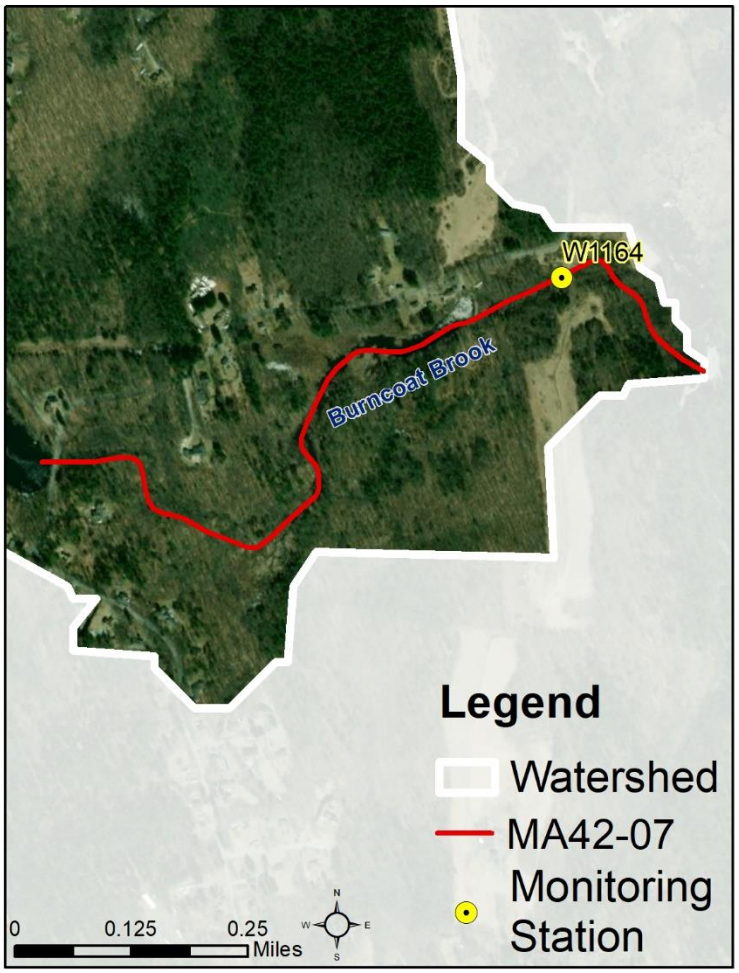


Figure 3-2. Location of monitoring station(s) along the impaired river segment.

3.3. Potential Pathogen Sources

Each potential pathogen source is described in further detail below.

Urban Stormwater: Portions of the watershed are moderately developed, with 97% of the land area in MS4 and 1% as DCIA. The developed areas within the watershed include medium density residential development around Cedar Meadow Pond and along Greenfield Street. Commercial and industrial infrastructure within the watershed is found along MA-9 along the northern edge of the watershed, areas of which are adjacent to upstream wetlands and may be hydrologically connected to the segment. Stormwater runoff from urban areas is likely a significant source of pathogens.

Illicit Sewage Discharges: Some of the western and most of the eastern portions of the watershed contain sewer service areas. Sewer related risks include leaking infrastructure (pipes, pump stations, etc.) and sanitary sewer overflows, which may be caused by undersized infrastructure, blockages, or excessive infiltration of groundwater or rainwater into pipes, exceeding system capacity. Illicit connections of wastewater to stormwater drains are also a risk.

On-Site Wastewater Disposal Systems: A portion of the watershed relies on septic systems for wastewater treatment. It is likely that a portion of septic systems are not being properly maintained and are discharging untreated effluent to groundwater.

Agriculture: Agricultural activities account for 8% of the total land use area within the watershed, though most activities are not adjacent to the segment or an upstream tributary or wetland. Those visible on recent aerial photos within the watershed include open fields and row crops. Agricultural activities related to manure storage and spreading, if not well managed, are a possible source of pathogens to waterbodies.

Pet Waste: Conservation and recreational lands, parks, ballfields, and residential streets within the watershed which may be popular for dog-walking, especially where paths are adjacent to rivers, ponds, or wetlands, may be a possible source of pathogens.

Wildlife Waste: Large open mowed areas such as conservation and recreational lands, fields, meadows, and wetlands with a clear sightline to a waterbody may attract excessive waterfowl and elevate indicator bacteria counts in the water.

3.4. Existing Local Management

This section identifies the municipalities immediately surrounding the impaired segment and its sub-basin. For a complete view of upstream municipalities and waterbodies, see the map in Figure 3-1.

Town of Leicester

About two thirds of Leicester is subject to stormwater regulations under the NPDES General MS4 Stormwater Permit. Leicester (Permit ID #MAR041202) has an EPA approved Notice of Intent (NOI). Leicester has a Stormwater Management Plan that will be available at the Highway Department Office and online on the town's website, following plan completion. The town has mapped all of its MS4 stormwater system, which is attached to the NOI. It adopted illicit discharge detection and elimination (IDDE) regulations in 2014, as well as erosion and sediment control (ESC) and post-construction stormwater regulations in 2011. According to the NOI, there are three outfalls into Burncoat Brook (MA42-07) and 13 outfalls into Grindstone Brook (MA42-18), both impaired for *E. coli*.

Leicester has the following relevant ordinances and bylaws:

- Stormwater Ordinance: https://www.leicesterma.org/sites/g/files/vyhlif781/f/uploads/stormwater_regs_6-20-2017.pdf (Town of Leicester, 2017)
- Title 5 Supplementary Regulation: Nothing beyond State of Massachusetts Title V Regulations.
- Wetland Protection Bylaw: Available in Chapter 9 of the General Bylaws: https://www.leicesterma.org/sites/g/files/vyhlif781/f/uploads/genbylaws_10-22-2019_final.pdf (Town of Leicester, 2019)

The Leicester Master Plan provides information on water resources within the Natural and Historic Resources section, noting that Leicester is at the headwaters of three drainage basins, affecting the Blackstone, French, and Chicopee River watersheds downstream (Town of Leicester, 2009). Within the Facilities and Services chapter, the plan mentions the town's MS4 and NPDES Phase II stormwater program. Information on the Phase II NPDES Permit Requirements mentions bacteria as a pollutant that can occur in illicit discharges. However, neither of the impaired segments within the town's border are mentioned in the plan. The master plan notes that no town beaches are open for swimming. The town has a municipal sewer system, noted in the Facilities and Services chapter of the Master Plan.

Leicester Town Website: https://www.leicesterma.org/ (Town of Leicester, 2020a)

Master Plan: https://www.leicesterma.org/sites/g/files/vyhlif781/f/uploads/2009mp.pdf (Town of Leicester, 2009)

Stormwater Web Page: https://www.leicesterma.org/highway-department/pages/stormwater-information (Town of Leicester, 2020b)
Open Space and Recreation Plan: https://www.leicesterma.org/sites/g/files/vyhlif781/f/uploads/2014osrp_0.pdf (Town of Leicester, 2015)

Town of Spencer

Twenty percent (20%) of Spencer is subject to stormwater regulations under the NPDES General MS4 Stormwater Permit. Spencer (Permit ID #MAR041162) has an EPA approved Notice of Intent (NOI). Spencer has a Stormwater Management Plan on file (link below) and has mapped all of its MS4 stormwater system. It adopted illicit discharge detection and elimination (IDDE), erosion and sediment control (ESC), and post-construction stormwater regulations in 2015-2017. There are no stormwater outfalls reported to impaired segments.

Spencer Stormwater Management Plan:
https://www.spencerma.gov/sites/g/files/vyhlif1246/f/uploads/2003spencerstormwatermanagementprogram.pdf
(Prism Environmental, Inc., 2003)

Spencer has the following relevant ordinances and bylaws:

- Stormwater bylaw Article 14: https://www.spencerma.gov/sites/g/files/vyhlif1246/f/uploads/general_bylaws_as_of_nov_7_2019_1.pdf (Town of Spencer, 2020)
- Stormwater regulations: https://www.spencerma.gov/sites/g/files/vyhlif1246/f/uploads/stormwater_regulations.pdf (Town of Spencer, 2016)
- Sewer Connections, Section 2 https://www.spencerma.gov/sites/g/files/vyhlif1246/f/uploads/general_bylaws_as_of_nov_7_2019_1.pdf (Town of Spencer, 2020)
- Wetland Protection bylaw Article 7: https://www.spencerma.gov/sites/g/files/vyhlif1246/f/uploads/general_bylaws_as_of_nov_7_2019_1.pdf (Town of Spencer, 2020)
- Pet waste: Article 9 Animal Control, Disposal of Animal waste https://www.spencerma.gov/sites/g/files/vyhlif1246/f/uploads/general_bylaws_as_of_nov_7_2019_1.pdf (Town of Spencer, 2020)
- Article 15: Water Conservation and Restriction By-Law; and Article 11: Miscellaneous, Sewer Connections; Comprehensive wastewater management plan: https://www.spencerma.gov/sites/g/files/vyhlif1246/f/uploads/general_bylaws_as_of_nov_7_2019_1.pdf (Town of Spencer, 2020)

In addition, the Town of Spencer's Master Plan mentions stormwater and dedicates a section to Community Septic Management Program. https://www.spencerma.gov/sites/g/files/vyhlif1246/f/uploads/master_plan.pdf (Town of Spencer, 2003)

Spencer's Open Space and Recreation Plan: https://www.spencerma.gov/sites/g/files/vyhlif1246/f/uploads/open_space_plan.pdf (Town of Spencer, 2012)

4. MA42-11 Wellington Brook

4.1. Waterbody Overview

The Wellington Brook segment MA42-11 is 3.4 miles long and begins south of Cedar Street and east of I-395 in Auburn, MA. The segment flows southwest into Oxford to end at its confluence with the French River in Oxford, MA.

There are several unnamed tributary streams. Named lakes and ponds in the watershed include Chimney Pond along the segment and Borrow Pit Pond. Key landmarks in the watershed include Exit 5 of I-395 and the Oxford airport. The segment is crossed by Depot Road, I-395 (including access ramps to Depot Road), and Main Street/MA-12 in Oxford.

Wellington Brook (MA42-11) drains an area of 3.6 square miles, of which 0.3 mi^2 (8%) is impervious and 0.1 mi^2 (4%) is directly connected impervious area (DCIA). The watershed is partially[4] served by public sewer and 49% is subject to stormwater regulations under the NPDES General MS4 Stormwater Permit (USEPA, 2020). There are no NPDES permits on file governing point source discharges of pollutants to surface waters and no MassDEP discharge to groundwater permits for on-site wastewater discharge within the watershed. There are also no combined sewer overflows, two landfills, and no unpermitted land disposal dumping grounds within the segment watershed. See Figure 4-1.

Wellington Brook watershed is mostly forested (60%), with moderate amounts of developed (18%) and agricultural (11%) land uses. The upper portion of the segment itself flows roughly parallel to the I-395 corridor, though the segment is well buffered within woods and large wetlands. The lower segment is crossed by Exit 5 of I-395, including several access ramps to Depot Road, then flows through a wooded and wetlands area. Agricultural fields are scattered throughout the watershed and are primarily used for hay and row crops.

In the Wellington Brook (MA42-11) watershed, under the Natural Heritage and Endangered Species Program, there are 324 acres (14%) of

Reduction from Highest Calculated Geomean: 85%

Watershed Area (Acres): 2,303

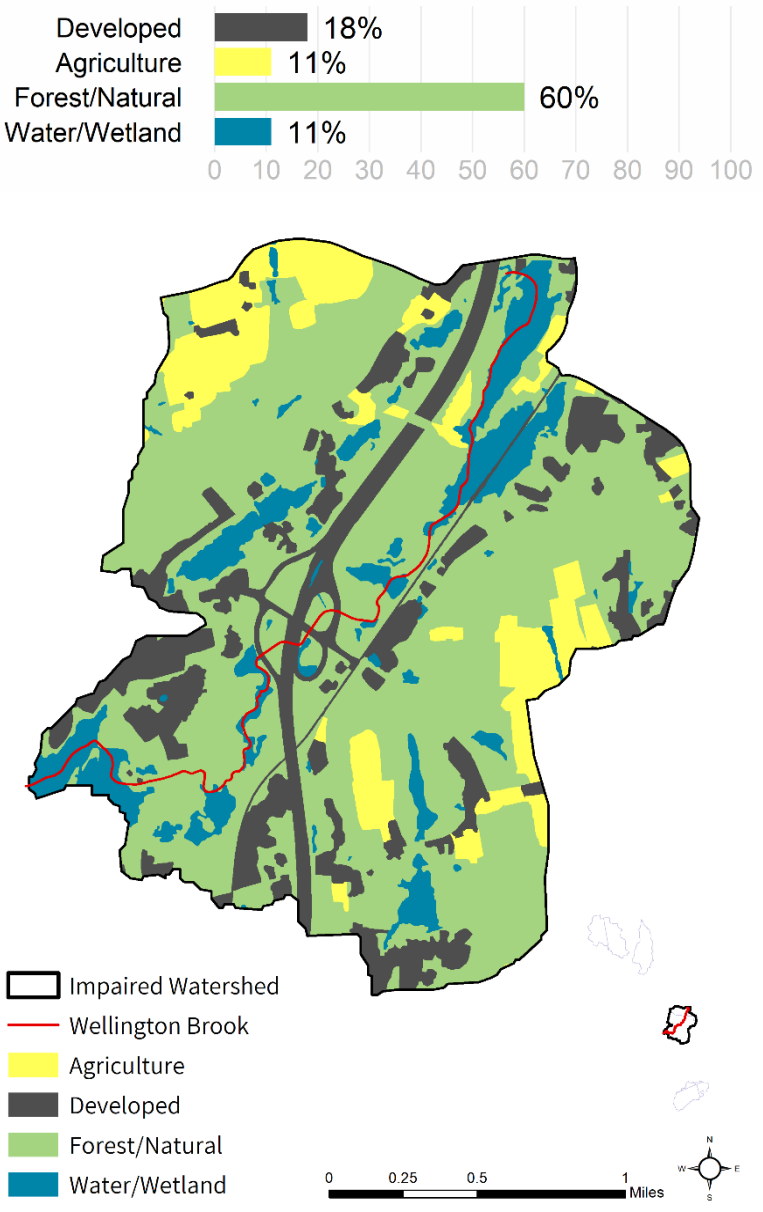
Segment Length (Miles): 3.4

Impairment(s): *E. coli* (Primary Contact Recreation)

Class (Qualifier): B

Impervious Area (Acres, %): 193 (8%)

DCIA Area (Acres, %): 91 (4%)

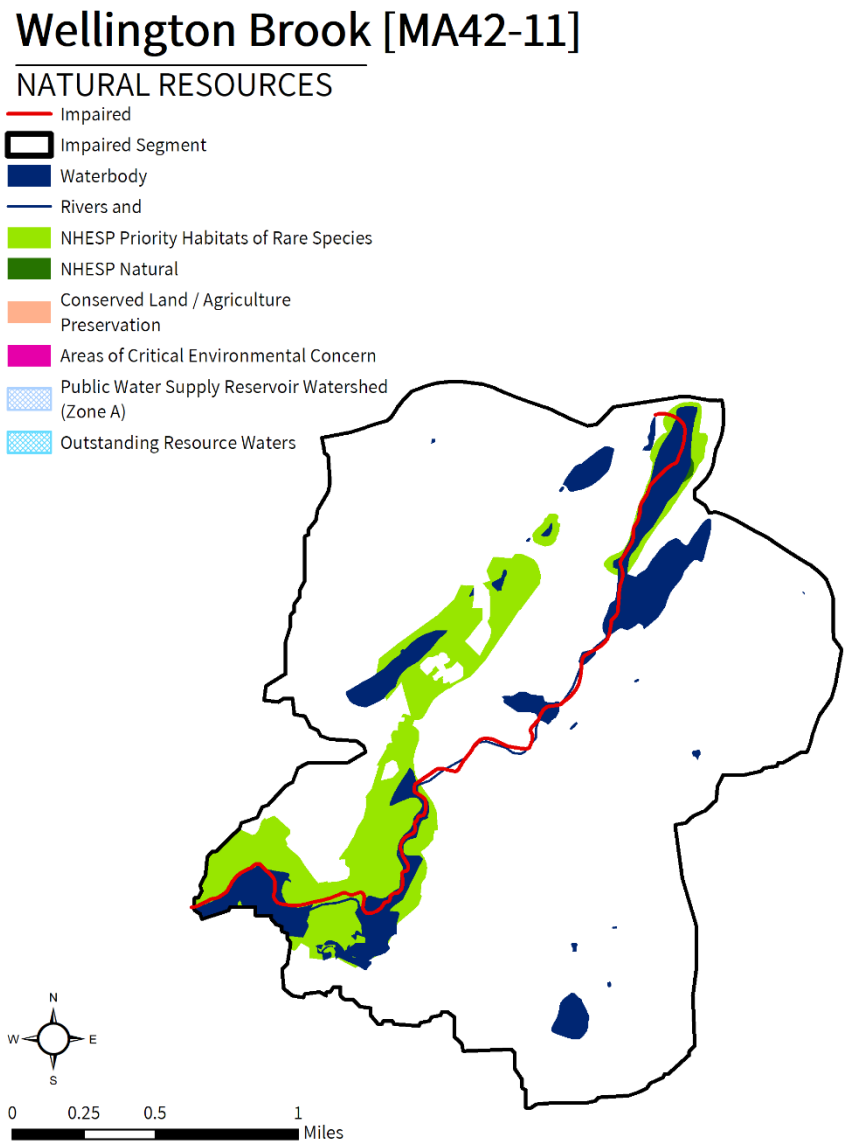


[4] Estimated percentage of developed areas with wastewater infrastructure in the watershed was based on available information: MWRA service areas, MassDEP's Water Utility Infrastructure Mapping Project https://www.mass.gov/guides/water-utility-resilience-program (MassDEP 2020), MS4 reports, and local knowledge.

Priority Habitats of Rare Species and seven acres (<1%) of Priority Natural Vegetation Communities. There are no Areas of Critical Environmental Concern, no areas under Public Water Supply protection, and no areas identified as Outstanding Resource Waters in the watershed. No areas protected in perpetuity[5] exist within the segment watershed, which would otherwise be part of a total of 70 acres (3%) of Protected and Recreational Open Space[6]. See Figure 4-1.

[5] Land protected in perpetuity include several interests such as conservation restriction, agricultural preservation, private deed restrictions, wetland restrictions, aquifer protection, historic preservation, etc. Refer to Mass GIS metadata for the Protected and Recreational Open Space data layer.

[6] Only land protected in perpetuity is shown on the natural resources map. Protected and Recreational Open Space estimates reflect areas in the State of Massachusetts only (and thus reflect only a portion of the total open space for watersheds that extend outside the State of Massachusetts).



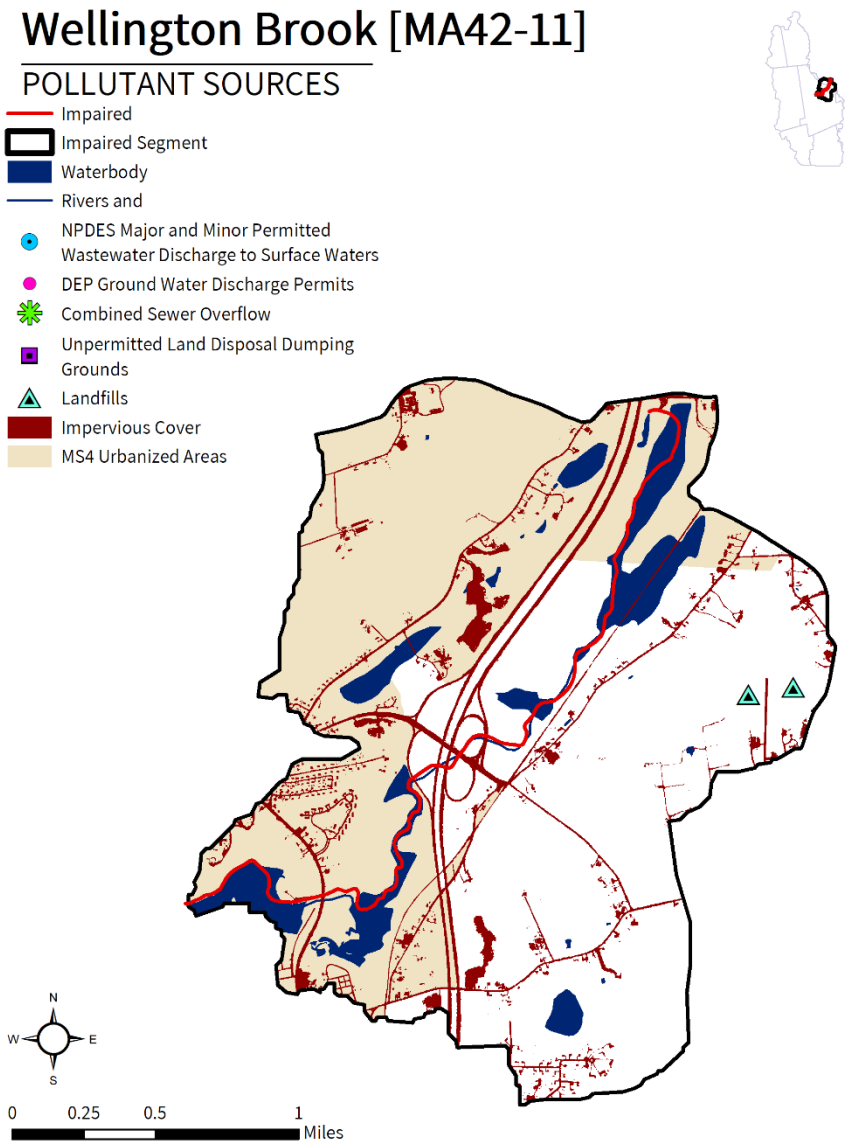


Figure 4-1. Natural resources and potential pollution sources draining to the Wellington Brook segment MA42-11. The map on the left shows critical habitat, water features, and conserved land. The map on the right indicates potential and known pollution sources, including impervious cover, MS4 areas, and permitted facilities.

4.2. Waterbody Impairment Characterization

Wellington Brook (MA42-11) is a Class B Water (MassDEP, 2021).

The Primary Contact Recreation use was assessed for attainment of SWQS using the indicator bacteria *E. coli* at the station listed below (refer to Tables 4-1, 4-2; Figure 4-2). Data were evaluated against the SWQS geomean criterion of 126 CFU/100 mL for *E. coli* indicator bacteria and the Statistical Threshold Value (STV) criterion of 410 CFU/100 mL for *E. coli.* The geomean and STV criteria for the impaired segment apply to data on a year-round, 90-day rolling basis.

- In 2011, six samples were collected at W2213, resulting in five days when the 90-day rolling geomean exceeded the criterion. Since there were no stations and years with more than 10 samples, the STV criterion was applied to single sample results. Out of six samples, one exceeded the STV criterion during dry weather.

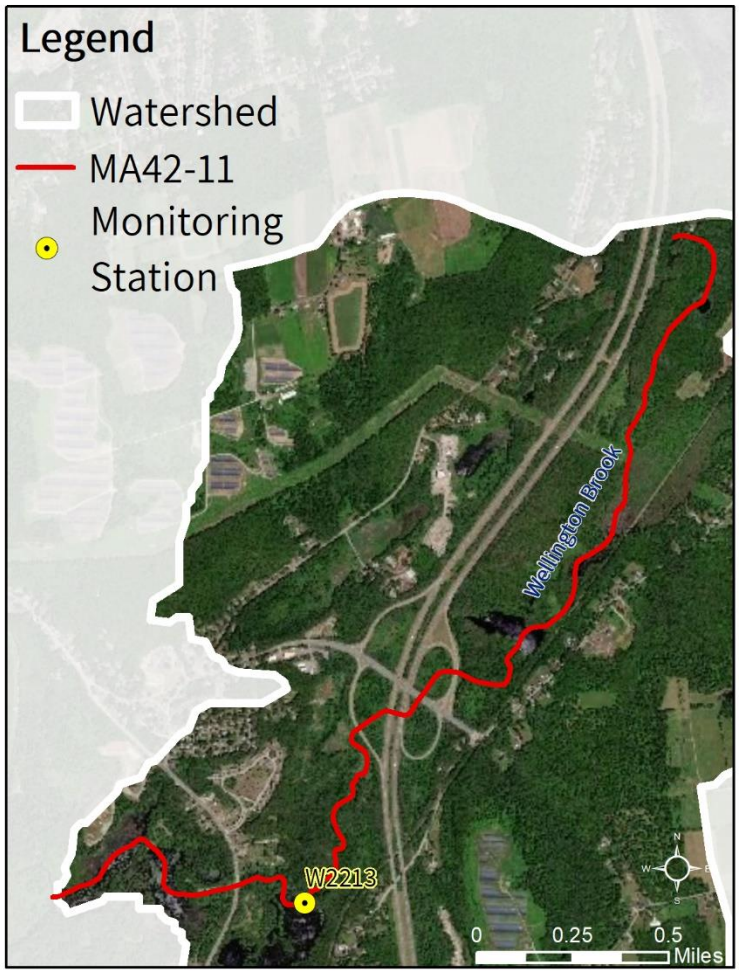


Figure 4-2. Location of monitoring station(s) along the impaired river segment.

Table 4-1. Summary of indicator bacteria sampling results by station for Wellington Brook (MA42-11). The maximum 90-day rolling geometric mean (geomean), the number of days exceeding the geomean criterion of 126 CFU/100 mL for *E. coli* indicator bacteria, and the number of single samples exceeding the Statistical Threshold Value (STV) criterion of 410 CFU/100 mL for *E. coli* indicator bacteria are shown. The STV criterion is applied to the single sample results if less than 10 samples were collected within a calendar year at a site. The highest maximum 90-day rolling geomean of the sites is used to calculate the percent load reduction required to meet SWQS.

Unique Station ID	First Sample	Last Sample	Count	Maximum 90-Day Rolling Geomean (CFU/100mL)	Number Geomean Exceedances	Number STV Exceedances
W2213	5/24/2011	10/3/2011	6	866	5	1

Table 4-2. Indicator bacteria data by station, indicator, and date for Wellington Brook (MA42-11). Each sample date was designated wet or dry weather with wet weather defined as more than 0.5 inches of precipitation in the previous 72 hours. Red text highlights criteria exceedances of 410 CFU/100 mL (applied to single-sample "Result" since there were no more than 10 samples in a year to calculate the Statistical Threshold Value or STV) and 126 CFU/100 mL (applied to rolling 90-day geomean) for *E. coli* indicator bacteria.

Unique Station ID	Indicator	Date	Wet/Dry	Result (CFU/100mL)	90-Day Rolling Geomean (CFU/100mL)	90-Day Rolling STV (CFU/100mL)
W2213	*E. coli*	5/24/2011	DRY	866	866	
W2213	*E. coli*	6/16/2011	WET	127	332	
W2213	*E. coli*	6/28/2011	WET	156	258	
W2213	*E. coli*	8/2/2011	DRY	99	203	
W2213	*E. coli*	8/30/2011	WET	172	136	
W2213	*E. coli*	10/3/2011	DRY	41	89	

4.3. Potential Pathogen Sources

Comparing data collected during wet weather versus dry weather conditions provides an indication of the types of sources present and information that can be used to focus pollutant reduction activities. Pathogen levels (as estimated by indicator bacteria) are usually higher in wet weather conditions as storm sewer systems overflow and/or stormwater runoff carries fecal matter that has accumulated on the landscape to the river via overland flow and stormwater conduits. Wet weather sources include wildlife and domesticated animal waste (including pets), urban stormwater runoff (including MS4 areas), CSOs, and SSOs. In other cases, dry weather pathogen and associated indicator bacteria concentrations can be high when there is a constant flow of pollutants during dry weather, which then becomes diluted during periods of precipitation. Dry weather sources include leaking sewer pipes, illicit connections of sanitary sewers to storm drains, failing septic systems, recreational use (such as swimmers), and direct wildlife and domesticated animal waste (including pets).

The indicator bacteria data for Wellington Brook (MA42-11) were elevated during dry weather, which suggests baseflow sources, such as leaking pipes, illegal cross connections, other illicit discharges, and failing septic systems, are likely to be major sources of pathogens.

Each potential pathogen source is described in further detail below.

Urban Stormwater: Portions of the watershed are moderately developed, with 49% of the land area in MS4 and 4% as DCIA. The developed areas within the watershed include low to medium density residential development, Exit 5 of I-395 which crosses the brook multiple times, and commercial/industrial infrastructure. Stormwater runoff from urban areas is likely a significant source of pathogens.

Illicit Sewage Discharges: Most of the upstream quarter of the watershed contains sewer service areas. Sewer related risks include leaking infrastructure (pipes, pump stations, etc.) and sanitary sewer overflows, which may be caused by undersized infrastructure, blockages, or excessive infiltration of groundwater or rainwater into pipes, exceeding system capacity. Illicit connections of wastewater to stormwater drains are also a risk.

On-Site Wastewater Disposal Systems: Most development in the watershed relies on septic systems for wastewater treatment. It is likely that a portion of septic systems are not being properly maintained and are discharging untreated effluent to groundwater.

Agriculture: Agricultural activities account for 11% of the total land use area within the watershed. Those activities visible on recent aerial photos within the watershed include open fields, hayfields, and row crops. Some of the land area labeled as agriculture has been converted into solar arrays such as the field between I-395, Depot Road, and Federal Hill Road. Agricultural activities related to manure storage and spreading, if not well managed, are a possible source of pathogens to waterbodies.

Pet Waste: Conservation and recreational lands, parks, ballfields, and residential streets within the watershed and along the segment which may be popular for dog-walking, especially where paths are adjacent to rivers, ponds, or wetlands, may be a possible source of pathogens.

Wildlife Waste: Large open mowed areas such as conservation and recreational lands, fields, meadows, and wetlands with a clear sightline to a waterbody within the watershed and along the segment may attract excessive waterfowl and elevate indicator bacteria counts in the water.

4.4. Existing Local Management

This section identifies the municipalities immediately surrounding the impaired segment and its sub-basin. For a complete view of upstream municipalities and waterbodies, see the map in Figure 2-1.

Town of Auburn

Most of Auburn is subject to stormwater regulations under the NPDES General MS4 Stormwater Permit. Auburn (Permit ID #MAR041088) has an EPA approved Notice of Intent (NOI). Auburn has a Stormwater Management Plan available at the Highway Department Office at 5 Millbury Street, Auburn, MA. The town has mapped all of its MS4 stormwater system, which is attached to its NOI. It adopted illicit discharge detection and elimination (IDDE), erosion and sediment control (ESC), and post-construction stormwater regulations in 2011. According to the NOI, there are 17 outfalls into Kettle Brook (MA51-01), impaired for *E. coli* and 86 outfalls into Dark Brook/Ramshorn (MA51-16), impaired for *E. coli*.

Auburn has the following ordinances and bylaws:

- Stormwater Ordinance and/or Bylaws: Chapter XIV of the General Bylaws: https://www.auburnguide.com/DocumentCenter/View/486/General-By-Laws-PDF (Aqualis, 2020)
- Stormwater Utility: None found.
- Title 5 Supplementary Regulation: Nothing beyond State of Massachusetts Title V Regulations.
- Wetland Protection Bylaw: https://www.auburnguide.com/DocumentCenter/View/565/Auburn-Wetland-Bylaws-PDF (Town of Auburn, 1979) and https://www.auburnguide.com/DocumentCenter/View/566/Auburn-Wetland-Regulations-PDF (Town of Auburn, 2014)
- Pet Waste Ordinance: Section 10.03; Leashing of Animals: https://www.auburnguide.com/DocumentCenter/View/486/General-By-Laws-PDF (Town of Auburn, 1979)

The current Auburn Master Plan, adopted in 2019, has a brief water resources section in the Natural, Cultural, & Historic Resources chapter, as well as a detailed water resources map (Town of Auburn). The water resources section mentions both Kettle Brook and Dark Brook which are pathogen-impaired segments within the town's borders. This section also notes that Rotary Beach at Stonehill Reservoir was closed several decades ago due to high levels of bacteria in the water. The town sewer serves most of Auburn's areas except for rural, hilly areas.

Auburn Town Website: https://www.auburnguide.com/ (Town of Auburn, 2020)

Master Plan: https://www.auburnguide.com/DocumentCenter/View/4770/Final-Approved-Master-Plan-11-12-2019-PDF (Town of Auburn, 2019)

Stormwater Web Page: https://www.auburnguide.com/668/Stormwater-Management (Town of Auburn n.d.)
Open Space and Recreation Plan: https://www.auburnguide.com/DocumentCenter/View/583/Approved-2014-Open-Space-Plan-PDF (Town of Auburn, 2016)

Town of Oxford

Approximately half of Oxford is subject to stormwater regulations under the NPDES General MS4 Stormwater Permit. Oxford (Permit ID #MAR041147) has an EPA approved Notice of Intent (NOI). Oxford does not have a Stormwater Management Plan available. The town has mapped all of its MS4 stormwater system, which is

available online. It adopted illicit discharge detection and elimination (IDDE), erosion and sediment control (ESC), and post-construction stormwater regulations in 2005. According to the NOI, there are no stormwater outfalls to impaired segments in the town.

Oxford has the following relevant ordinances and bylaws:

- Stormwater Ordinance and/or Bylaws: Chapters 65 through 67 in the Town of Oxford General Bylaws: https://www.town.oxford.ma.us/storm-water-management/pages/local-stormwater-management-bylaws (Town of Oxford, 2005)
- Title 5 Supplementary Regulation: Nothing beyond State of Massachusetts Title V Regulations.
- Wetland Protection Bylaw: Nothing beyond State of Massachusetts wetland protection regulations.
- Pet Waste Ordinance: General Bylaws, Chapter 51, section 9. https://www.town.oxford.ma.us/sites/oxfordma/files/uploads/general_by-laws_01-07-2020.pdf (Town of Oxford, 2005)

The Oxford Master Plan provides policies and action steps to protect water quality and water resources (Town of Oxford, 2017). The water resources section also mentions general stormwater runoff and pollutant discharge as major threats to water quality. Oxford does not have any impaired streams within its borders, and the plan does not mention bacteria or pathogens. The plan has a chapter on improving utility infrastructure, in which it notes that, historically, most development in Oxford has been served by septic systems, though the town plans to extend sewer access to allow growth and development.

Oxford Town Website: https://www.town.oxford.ma.us/ (Town of Oxford, 2020)

Master Plan: https://www.town.oxford.ma.us/planning-board/pages/master-plan-2017-2027 (Town of Oxford, 2017)

Stormwater Web Page: https://www.town.oxford.ma.us/stormwater-management (Town of Oxford, n.d.)

Open Space and Recreation Plan:
https://www.town.oxford.ma.us/sites/oxfordma/files/uploads/oxford_osrp_final.pdf (Town of Oxford, 2007)

5. MA42-15 Sucker Brook

5.1. Waterbody Overview

Sucker Brook segment MA42-15 is 1.7 miles long and begins at the outlet of Nipmuck Pond in Webster, MA. The segment flows southwest along Sutton Road, then ends at the inlet of Club Pond in Webster.

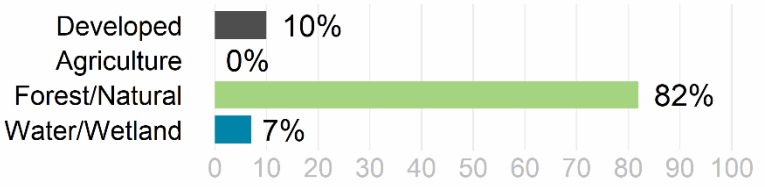
Sucker Brook has several unnamed tributaries. Named lakes and ponds in the watershed include Grassey Pond and Nipmuck Pond. Key landmarks in the watershed include the Town Forest Wood Lot and portions of the Mine Brook Wildlife Management Area, both in Webster. The segment is crossed by Camile Road, Sutton Road (twice), Kingsbury Road, and Minebrook Road, all within Webster.

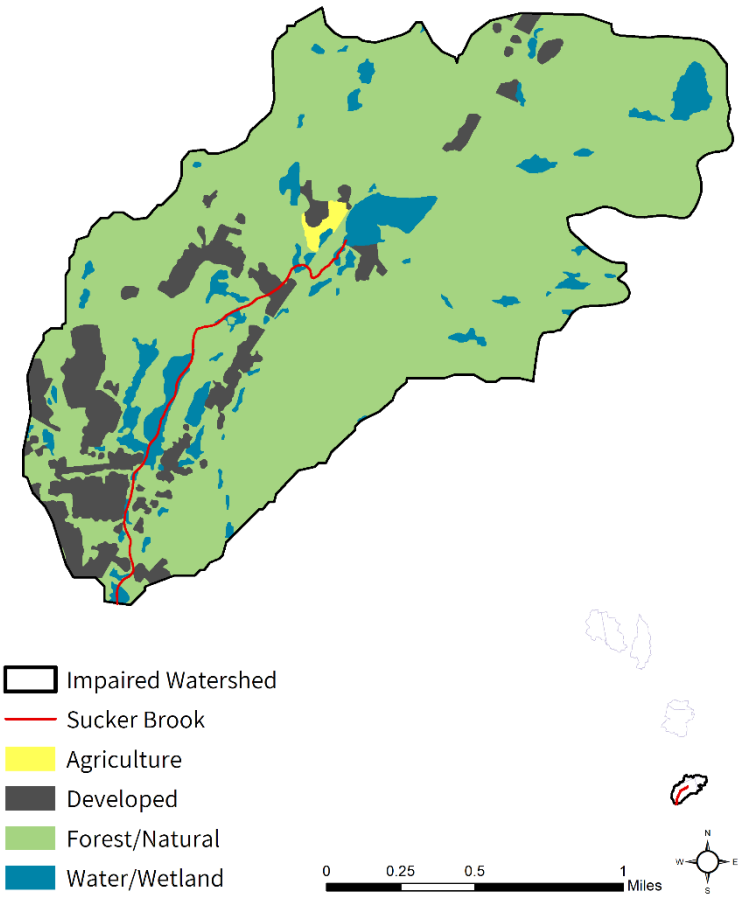
Sucker Brook (MA42-15) drains an area of 2.6 square miles, of which 0.2 mi^2 (7%) is impervious and 0.1 mi^2 (4%) is directly connected impervious area (DCIA). The watershed is partially[7] served by public sewer and 9% is subject to stormwater regulations under the NPDES General MS4 Stormwater Permit (USEPA, 2020). There are no NPDES permits on file governing point source discharges of pollutants to surface waters and no MassDEP discharge to groundwater permits for on-site wastewater discharge within the watershed. There are also no combined sewer overflows, no landfills, and no unpermitted land disposal dumping grounds within the watershed. See Figure 5-1.

The Sucker Brook watershed is predominantly forested (82%), with moderate development (10%) and minimal agriculture (<1%). The segment flows through mostly wooded areas, with a few low-density residential developments near the downstream portions. The only agricultural land use mapped within the segment watershed appears in recent aerial photos to be residential lawn.

In the Sucker Brook (MA42-15) watershed, under the Natural Heritage and Endangered Species Program, there are 109 acres (7%) of Priority Habitats of Rare Species. There are no Areas of Critical Environmental Concern, no areas under Public Water Supply protection, and no areas

Reduction from Highest Calculated Geomean: NA
Watershed Area (Acres): 1,644
Segment Length (Miles): 1.7
Impairment(s): *E. coli* (Primary Contact Recreation)
Class (Qualifier): B
Impervious Area (Acres, %): 113 (7%)
DCIA Area (Acres, %): 59 (4%)





[7] Estimated percentage of developed areas with wastewater infrastructure in the watershed was based on available information: MWRA service areas, MassDEP's Water Utility Infrastructure Mapping Project https://www.mass.gov/guides/water-utility-resilience-program (MassDEP 2020) MS4 reports, and local knowledge.

identified as Outstanding Resource Waters in the watershed. Over 18 acres (1%) of land protected in perpetuity[8] exist within the segment watershed, which is part of a total of 386 acres (23%) of Protected and Recreational Open Space[9]. See Figure 5-1.

[8] Land protected in perpetuity include several interests such as conservation restriction, agricultural preservation, private deed restrictions, wetland restrictions, aquifer protection, historic preservation, etc. Refer to Mass GIS metadata for the Protected and Recreational Open Space data layer.

[9] Only land protected in perpetuity is shown on the natural resources map. Protected and Recreational Open Space estimates reflect areas in the State of Massachusetts only (and thus reflect only a portion of the total open space for watersheds that extend outside the State of Massachusetts).

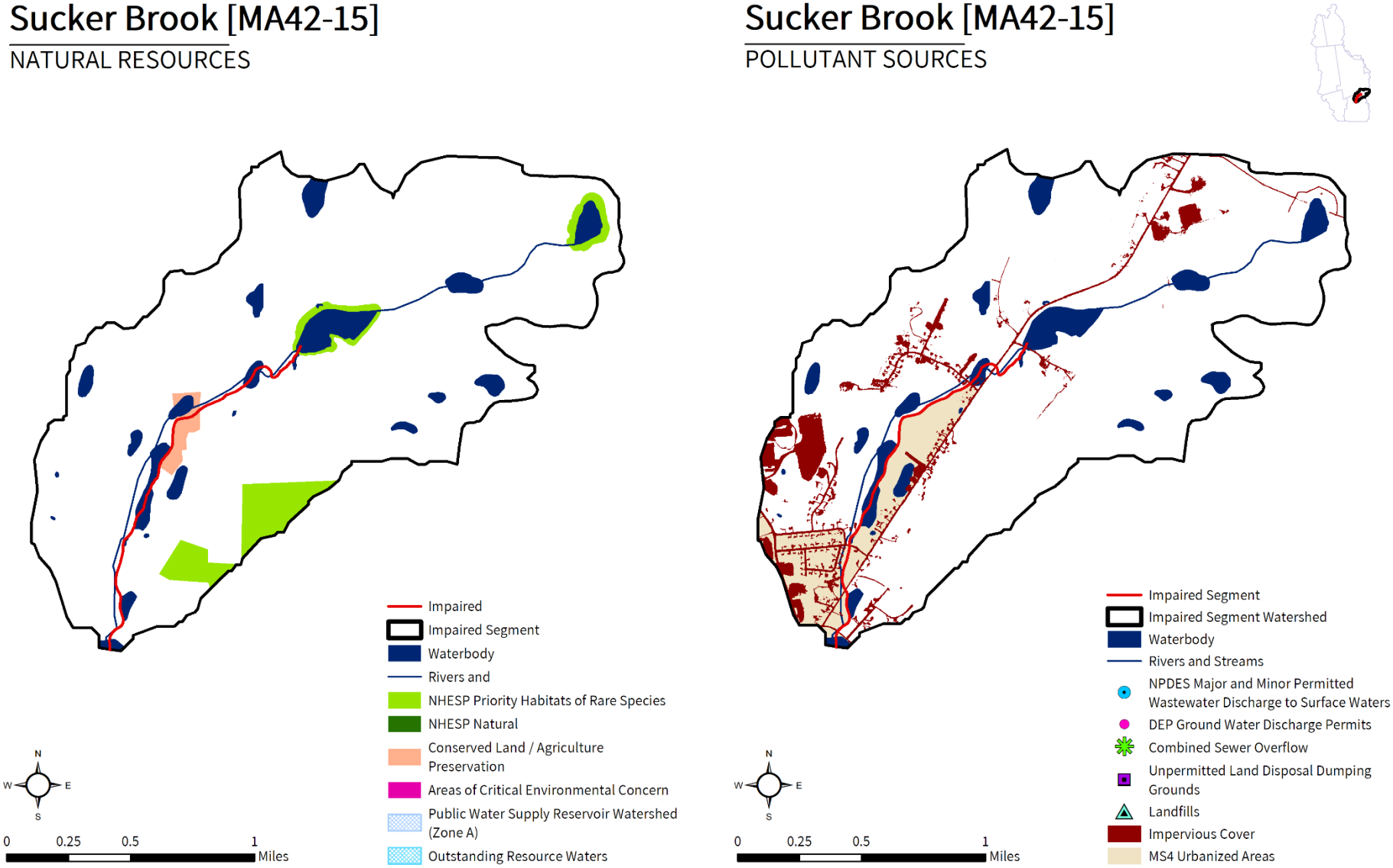


Figure 5-1. Natural resources and potential pollution sources draining to the Sucker Brook segment MA42-15. The map on the left shows critical habitat, water features, and conserved land. The map on the right indicates potential and known pollution sources, including impervious cover, MS4 areas, and permitted facilities.

5.2. Waterbody Impairment Characterization

Sucker Brook (MA42-15) is a Class B Water (MassDEP, 2021).

The impairment decision is carried forward from the 2004-2008 Water Quality Assessment Report (MassDEP, 2009). MassDEP collected fecal coliform and *E. coli* samples in Sucker Brook at the Sutton Road crossing just upstream from Mine Brook Road (W1178) on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 149 CFU/100mL and did not meet the criteria for Primary Contact Recreation use.

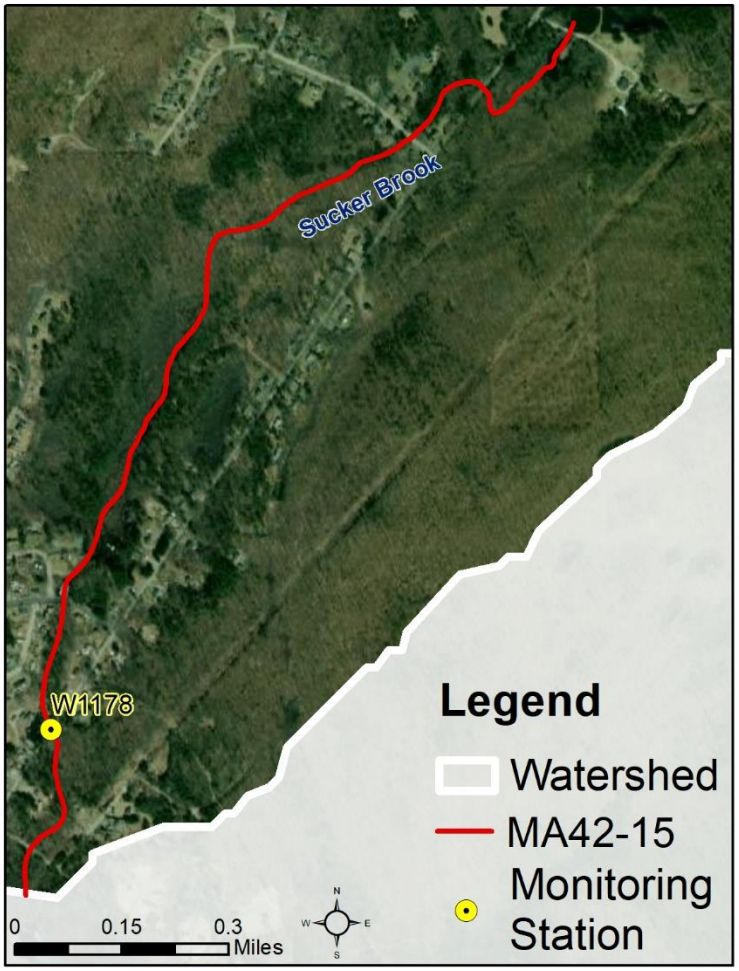


Figure 5-2. Location of monitoring station(s) along the impaired river segment.

5.3. Potential Pathogen Sources

Each potential pathogen source is described in further detail below.

Urban Stormwater: Portions of the watershed are moderately developed, with 9% of the land area in MS4 and 4% as DCIA. The developed areas within the watershed include low to medium density residential development. Stormwater runoff from urban areas is likely a significant source of pathogens.

Illicit Sewage Discharges: A portion of the watershed contains sewer service areas. Sewer related risks include leaking infrastructure (pipes, pump stations, etc.) and sanitary sewer overflows, which may be caused by undersized infrastructure, blockages, or excessive infiltration of groundwater or rainwater into pipes, exceeding system capacity. Illicit connections of wastewater to stormwater drains are also a risk.

On-Site Wastewater Disposal Systems: Most development in the watershed relies on septic systems for wastewater treatment. It is likely that a portion of septic systems are not being properly maintained and are discharging untreated effluent to groundwater.

Agriculture: Agricultural activities account for <1% of the total land use area within the watershed. As reviewed on recent aerial photos, the one agricultural plot of land within the watershed appears to be an open field next to a large house, with no signs of livestock or row crops. Stormwater runoff from agricultural lands are likely not a current source of pathogens to the segment.

Pet Waste: Conservation and recreational lands, parks, and residential neighborhoods popular for dog-walking, especially where paths are adjacent to rivers, ponds, or wetlands, may be a possible source of pathogens.

Wildlife Waste: Open wetlands or mowed areas with a clear sightline to a waterbody, such as the mowed area adjacent to Nipmuck Pond at the headwaters of the segment, may attract excessive waterfowl and elevate indicator bacteria counts in the water.

5.4. Existing Local Management

This section identifies the municipalities immediately surrounding the impaired segment and its sub-basin. For a complete view of upstream municipalities and waterbodies, see the map in Figure 2-1.

Town of Douglas

A small portion of Douglas is subject to stormwater regulations under the NPDES General MS4 Stormwater Permit. Douglas (Permit ID #MAR041106) has an EPA approved Notice of Intent (NOI) to be covered under the MS4 General Permit through June 30, 2022. Douglas does not yet have a completed Stormwater Management Plan available. The town has mapped all of its MS4 stormwater system. It adopted illicit discharge detection and elimination (IDDE) regulations in 2008, as well as erosion and sediment control (ESC) and post-construction stormwater regulations in 2012. According to the NOI, there are no stormwater outfalls to impaired segments in the town.

Douglas has the following relevant ordinances and bylaws:

- Stormwater Ordinance and/or Bylaws: Nothing beyond state regulations.
- Stormwater Utility: None found.
- Title 5 Supplementary Regulation: Nothing beyond State of Massachusetts Title V Regulations.
- Wetland Protection Bylaw: https://douglas-ma.gov/DocumentCenter/View/421/Wetland-Bylaw-PDF?bidId= (Town of Douglas, 2003)
- Pet Waste Ordinance: None found.
- Contact Recreation Ordinance: None found.

The Douglas Master Plan was adopted in 1998 and has a water features section in the Natural Resources chapter detailing floodplains, wetlands, and surface waters (Town of Douglas, 1998). The Douglas Open Space Plan from 2007 also provides a detailed Water Resources and Hydrology section. The Open Space Plan mentions that a stormwater management bylaw has been adopted by the town. Neither plan includes information on bacteria or pathogen impairment within Douglas, and the town does not list any impaired segments within its borders. The master plan has a wastewater section in the Services and Facilities chapter. It notes that as of 1998, the town's sewer system services the East Douglas Area and the town has planned upgrades to the treatment facility and potential sewer expansion.

Douglas Town Website: https://www.douglas-ma.gov/ (Town of Douglas, 2020)

Master Plan: (1998) http://www.douglasma.org/cdd/mpic/docs/masterplan.pdf (Town of Douglas, 1998)

Stormwater Web Page: https://douglas-ma.gov/512/MS4-Stormwater (Town of Douglas, n.d.)
Open Space and Recreation Plan: http://www.douglasma.org/cdd/os/reports/071130-openspaceplan.pdf (Town of Douglas, 2007)

Town of Oxford. See Section 4.4

Town of Webster

Most of Webster is subject to stormwater regulations under the NPDES General MS4 Stormwater Permit. Webster (Permit ID #MAR041170) has an EPA approved Notice of Intent (NOI) to be covered under the MS4 General Permit through June 30, 2022. Webster's Stormwater Management Plan will be available at the Highway Department upon completion. The town has mapped all its MS4 stormwater system, which is available attached to the NOI. It adopted illicit discharge detection and elimination (IDDE), erosion and sediment control (ESC), and post-construction stormwater regulations in 2012. According to the NOI, there are six outfalls to the pathogen-impaired French River (MA42-05) and 10 outfalls into the tributary/wetland to the pathogen-impaired French River (MA42-05 and MA42-06). There are two outfalls to pathogen-impaired Sucker Brook (MA42-15) and four outfalls into the tributary/wetland to pathogen-impaired Sucker Brook (MA42-15).

Webster has the following ordinances and bylaws:

- Stormwater Ordinance and/or Bylaws: https://www.webster-ma.gov/DocumentCenter/View/8467/Town-of-Webster-By-laws-Chapter-570---Stormwater-Management (Town of Webster n.d., a)
- Stormwater Utility: None found.
- Title 5 Supplementary Regulation: Nothing beyond State of Massachusetts Title V Regulations.
- Wetland Protection Bylaw: https://www.webster-ma.gov/DocumentCenter/View/8466/Town-of-Webster-By-laws-Chapter-636---Wetlands-Protection (Town of Webster n.d., b.)
- Pet Waste Ordinance: https://www.ecode360.com/9233450 (Town of Webster, 2008)
- Contact Recreation Ordinance: None found.

The Webster Master Plan provides an extensive section on Water Resources within the Natural, Historic, and Cultural Resources chapter (VHB, Inc., 2014). It notes that most of the town falls within the French River watershed and a smaller portion of the town falls within the Blackstone River watershed. The plan does not mention MS4 or NPDES Phase II work but notes that reducing nonpoint source pollution through sustainable stormwater management techniques is a goal. Sucker Brook and the French River, the two pathogen-impaired segments within the town's borders, are both mentioned in the plan. Bacteria or pathogens are not mentioned. The plan notes in the Public Facilities and Services chapter that the Wastewater Treatment Facility is currently functioning under capacity due to the loss of several large water consuming industries. The Sewer Department will continue to perform upgrades and equipment replacements.

Webster Town Website: https://www.webster-ma.gov/ (Town of Webster, 2020)

Master Plan: https://www.webster-ma.gov/DocumentCenter/View/777/Final-Webster-Master-Plan-2014-PDF?bidId= (VHB, Inc., 2014)

Stormwater Web Page: https://www.webster-ma.gov/925/Stormwater-Management-in-Webster (Town of Webster n.d., c.)

Open Space and Recreation Plan: https://www.webster-ma.gov/DocumentCenter/View/7985/Open-Space-and-Recreation-Plan-2019 (CME Associates, Inc., 2018)

6. MA42-18 Grindstone Brook

6.1. Waterbody Overview

The Grindstone Brook segment MA42-18 is 2.3 miles long and begins at the outlet of Henshaw Pond in Leicester, MA. The segment flows to the south to end at the inlet to Rochdale Pond in Leicester, MA.

Tributaries to the Grindstone Brook segment MA42-18 include only unnamed streams. There are no named lakes and ponds within the watershed beside Henshaw Pond. Key landmarks in the watershed include the Leicester Middle School, Russell Memorial Park, the Hillcrest Country Club, Leicester Memorial School, and the Kindred Hospital Park View of Central Mass. The segment is crossed by King Street, Peter Salem Road, Clark Street, and Huntoon Memorial Highway/MA-56 in Leicester.

Grindstone Brook (MA42-18) drains an area of 3.0 square miles, of which 0.2 mi^2 (7%) is impervious and 0.1 mi^2 (3%) is directly connected impervious area (DCIA). The watershed is partially[10] served by public sewer and 33% is subject to stormwater regulations under the NPDES General MS4 Stormwater Permit (USEPA, 2020). There are no NPDES permits on file governing point source discharges of pollutants to surface waters and no MassDEP discharge to groundwater permits for on-site wastewater discharge within the watershed. There are also no combined sewer overflows, no landfills, and no unpermitted land disposal dumping grounds within the segment watershed. See Figure 6-1.

The Grindstone Brook watershed is primarily forested (60%), with a moderate level of low to medium density mixed development (18%). Commercial and residential development within the segment watershed is concentrated in the northern tip of the watershed near Leicester town center. Development along the western edge of the watershed follows MA-56. Agricultural land to the east of the segment is primarily used for row crops, although some livestock may be present within a confined facility which was installed between 2010 and 2015 (according to Google Earth historic

Reduction from Highest Calculated Geomean: NA

Watershed Area (Acres): 1,905

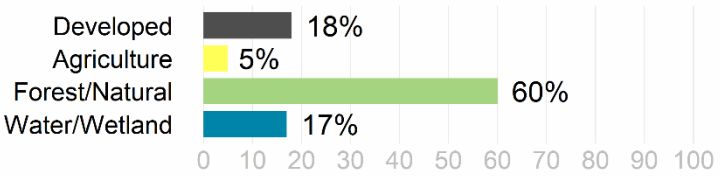
Segment Length (Miles): 2.3

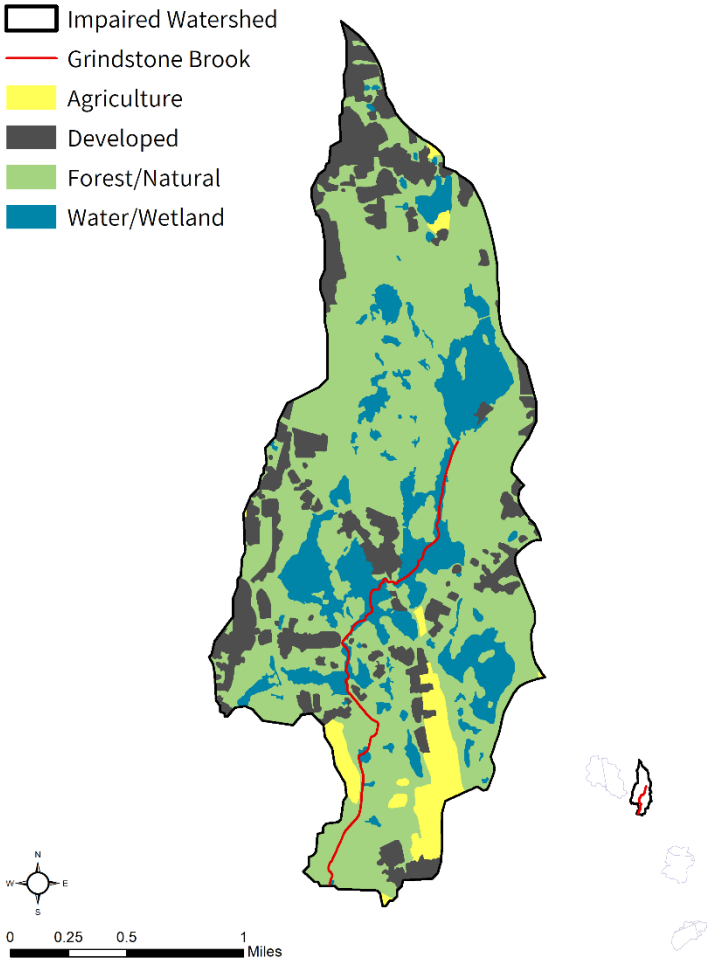
Impairment(s): *E. coli* (Primary Contact Recreation)

Class (Qualifier): B

Impervious Area (Acres, %): 132 (7%)

DCIA Area (Acres, %): 59 (3%)





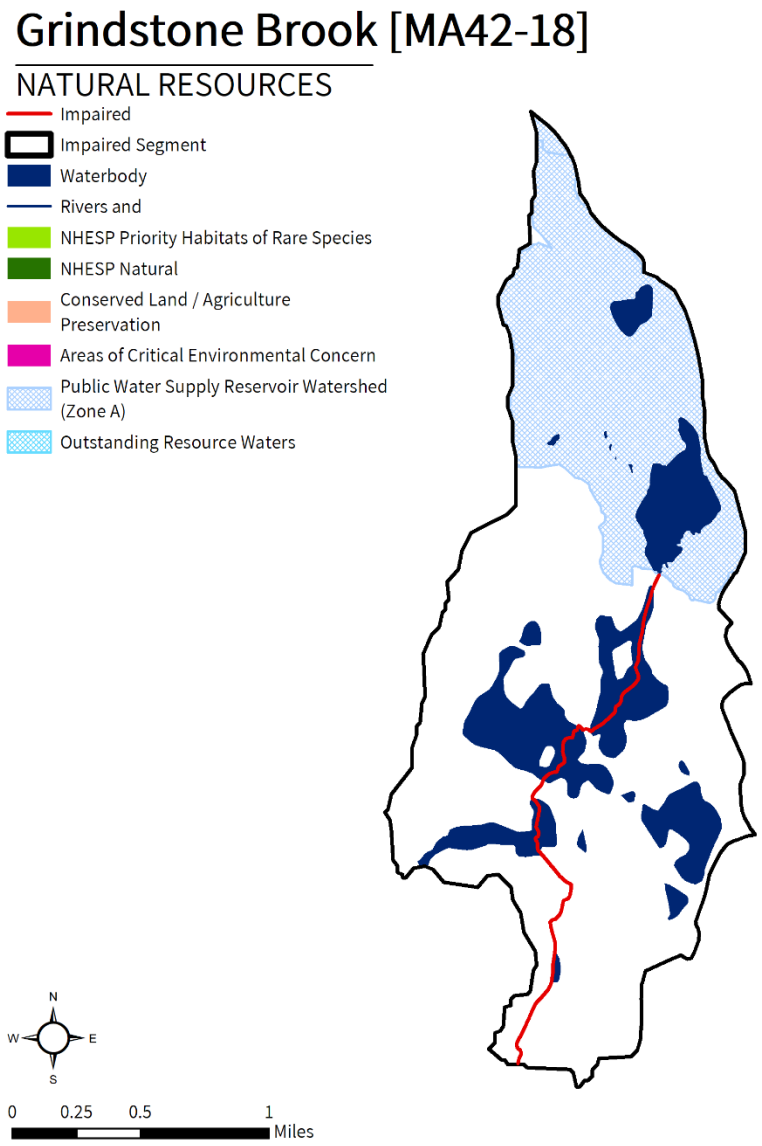
[10] Estimated percentage of developed areas with wastewater infrastructure in the watershed was based on available information: MWRA service areas, MassDEP's Water Utility Infrastructure Mapping Project https://www.mass.gov/guides/water-utility-resilience-program (MassDEP 2020) MS4 reports, and local knowledge.

imagery). Wetlands areas represent 17% of the watershed and include the Great Cedar Swamp.

In the Grindstone Brook (MA42-18) watershed, under the Natural Heritage and Endangered Species Program, there are no areas of Priority Habitats of Rare Species or Priority Natural Vegetation Communities. There are 593 acres (31%) under Public Water Supply protection, but no Areas of Critical Environmental Concern or areas identified as Outstanding Resource Waters in the watershed. There are no areas protected in perpetuity[11] within the segment watershed, which would otherwise be part of a total of 514 acres (27%) of Protected and Recreational Open Space[12]. See Figure 6-1.

[11] Land protected in perpetuity include several interests such as conservation restriction, agricultural preservation, private deed restrictions, wetland restrictions, aquifer protection, historic preservation, etc. Refer to Mass GIS metadata for the Protected and Recreational Open Space data layer.

[12] Only land protected in perpetuity is shown on the natural resources map. Protected and Recreational Open Space estimates reflect areas in the State of Massachusetts only (and thus reflect only a portion of the total open space for watersheds that extend outside the State of Massachusetts).



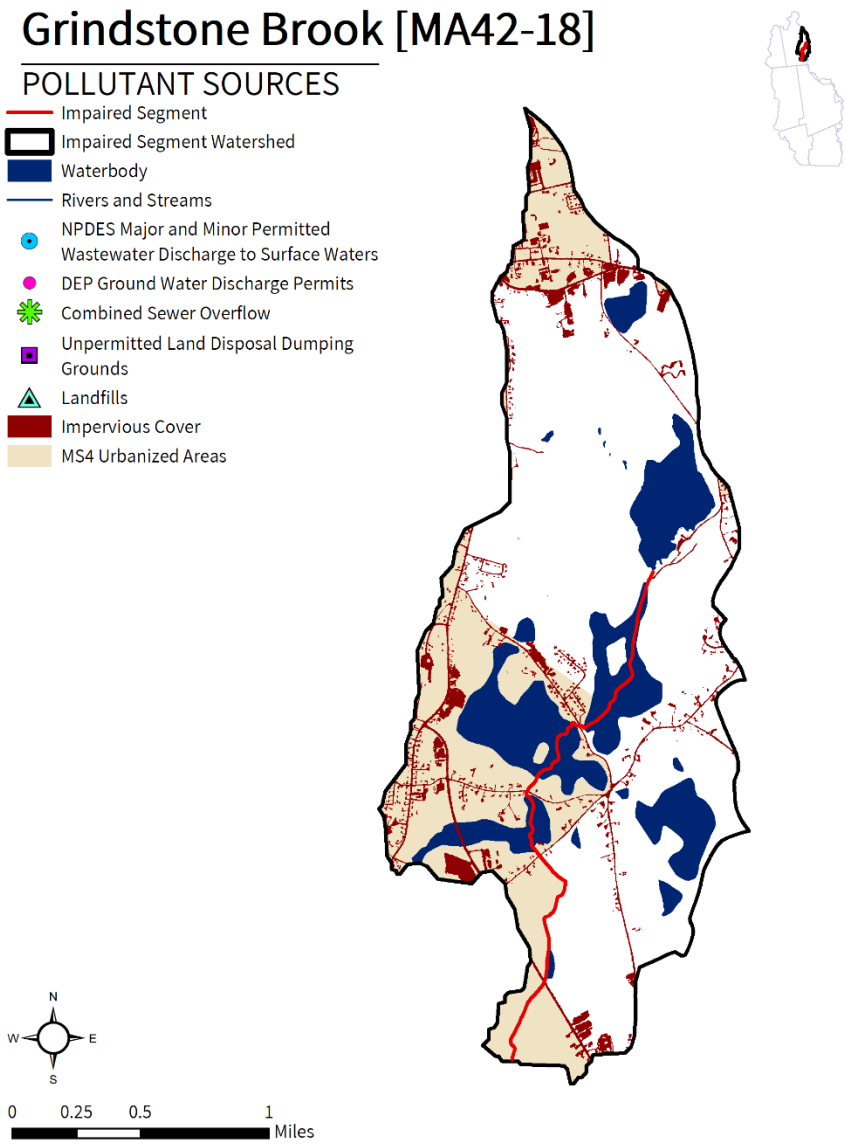


Figure 6-1. Natural resources and potential pollution sources draining to the Grindstone Brook segment MA42-18. The map on the left shows critical habitat, water features, and conserved land. The map on the right indicates potential and known pollution sources, including impervious cover, MS4 areas, and permitted facilities.

6.2. Waterbody Impairment Characterization

Grindstone Brook (MA42-18) is a Class B Water (MassDEP, 2021).

The impairment decision is carried forward from the 2004-2008 Water Quality Assessment Report (MassDEP, 2009). MassDEP collected fecal coliform and *E. coli* samples in Grindstone Brook (Station W1177) in Leicester on five occasions between May and September 2004. The geometric mean of *E. coli* counts is 563 CFU/100mL and did not meet the criteria for Primary Contact Recreation use.

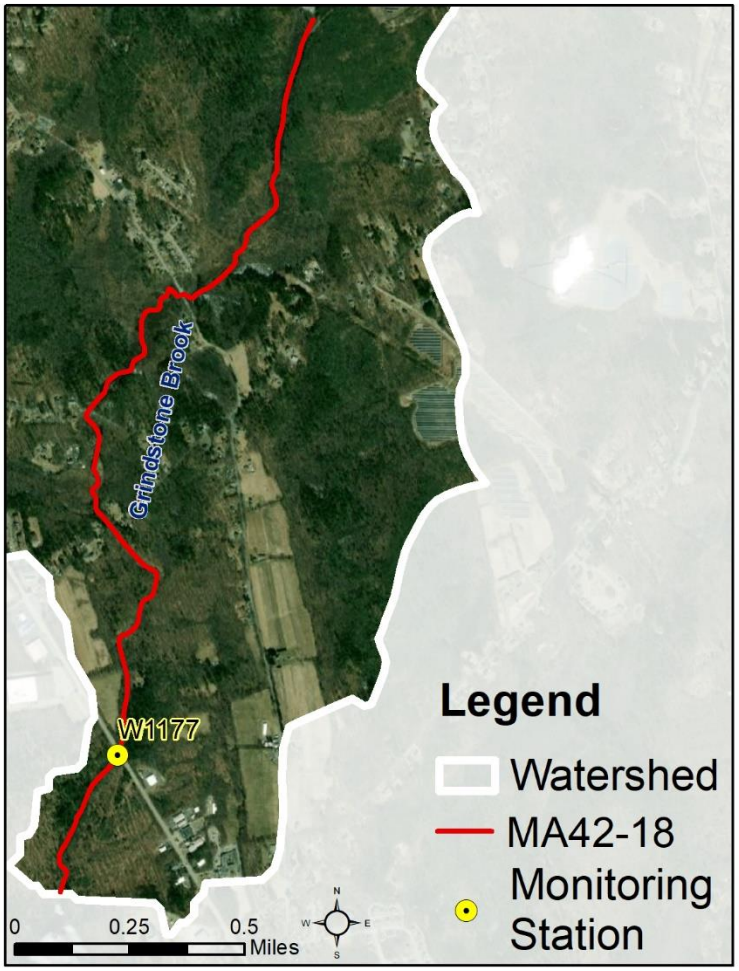


Figure 6-2. Location of monitoring station(s) along the impaired river segment.

6.3. Potential Pathogen Sources

Each potential pathogen source is described in further detail below.

Urban Stormwater: Portions of the watershed are moderately developed, with 33% of the land area in MS4 and 3% as DCIA. The developed areas within the watershed include low to medium density mixed residential and commercial development. Stormwater runoff from urban areas is likely a significant source of pathogens.

Illicit Sewage Discharges: Some of the watershed contains sewer service areas. Sewer related risks include leaking infrastructure (pipes, pump stations, etc.) and sanitary sewer overflows, which may be caused by undersized infrastructure, blockages, or excessive infiltration of groundwater or rainwater into pipes, exceeding system capacity. Illicit connections of wastewater to stormwater drains are also a risk.

On-Site Wastewater Disposal Systems: Most development in the watershed relies on septic systems for wastewater treatment. It is likely that a portion of septic systems are not being properly maintained and are discharging untreated effluent to groundwater.

Agriculture: Agricultural activities account for 5% of the total land use area within the watershed. As reviewed on recent aerial photos, agricultural activities within the watershed include open fields and row crops.

Pet Waste: Conservation and recreational lands, parks, and residential neighborhoods popular for dog-walking, especially where paths are adjacent to rivers, ponds, or wetlands, may be a possible source of pathogens.

Wildlife Waste: There are several large, open wetlands along the segment. Open wetlands and mowed areas such as conservation and recreational lands, fields, and meadows with a clear sightline to a waterbody may attract excessive waterfowl and elevate indicator bacteria counts in the water.

6.4. Existing Local Management

This section identifies the municipalities immediately surrounding the impaired segment and its sub-basin. For a complete view of upstream municipalities and waterbodies, see the map in Figure 2-1.

Town of Leicester. See Section 3.4

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