MASSACHUSETTS
watershed·based plans

WATERSHED-BASED PLAN

Town of Milton

September 2022

Prepared By:

Town of Milton, MA
Geosyntec Consultants, Inc.

Prepared For:

MassDEP
Commonwealth of Massachusetts
Department of Environmental Protection

This project has been financed with Federal Funds from the Environmental Protection Agency (EPA) to the Massachusetts Department of Environmental Protection (the Department) under an s. 319 competitive grant. The contents do not necessarily reflect the views and policies of EPA or of the Department, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

Contents

Executive Summary

Introduction: The purpose of a Massachusetts Watershed-Based Plan (WBP) is to organize information about Massachusetts' watersheds and present the information in a format that will enhance the development and implementation of projects that will restore water quality and beneficial uses in the Commonwealth. The Massachusetts WBP follows the United States Environmental Protection Agency's (EPA's) recommended format for "nine-element" watershed plans. This WBP was developed by Geosyntec Consultants (Geosyntec) under the direction of the Town of Milton, Massachusetts, with funding, input, and collaboration from the Massachusetts Department of Environmental Protection (MassDEP).

This WBP has been prepared for the five subwatersheds within the Town of Milton, which has a total area of 8,438 acres. The majority of the Town (three of the subwatersheds) is within the greater Neponset River basin, one subwatershed is within the Quincy Bay basin, and one subwatershed is within the Monatiquot River basin. A municipal separate storm sewer system (MS4) encompasses the entire Town of Milton. Major ponds and streams within Milton include downstream segments of the Neponset River (MA73-02; MA73-03; MA73-04) Unquity Brook (MA73-26), Pine Tree Brook (MA73-29)[1], Turners Pond (MA73059), Trout Brook, Russell Pond (MA73003), Chestnut Run, Gulliver Creek (MA73-30), Balster Brook, Blue Hill River, and Hoosiwhisick Pond (MA74015).

Impairments and Pollution Sources: Segments of the Neponset River (MA73-02; MA73-03; MA73-04), Pine Tree Brook (MA73-29), Turners Pond (MA73059), Unquity Brook (MA73-26), Gulliver Creek (MA73-30), and Russell Pond (MA73003) are identified as category 5 waterbodies on the Massachusetts Year 2016 Integrated List of Waters (303(d) list) due to numerous impairments including turbidity, debris, trash, metals, Escherichia Coli (*E. Coli)*, fecal coliform, Dissolved Oxygen (DO), Total Phosphorus (TP), non-native aquatic plants, and others. Additionally, the Neponset River Basin (including these impaired waterbodies) has a Total Maximum Daily Load (TMDL) for bacteria (MassDEP, 2002).

Many of the suspected sources of these impairments are listed on the 303(d) list as unknown. Sources that are listed include illegal dumping or other inappropriate waste disposal, discharges from municipal separate storm sewer systems (MS4s), contaminated sediments, combined sewer overflows (CSOs), wet weather discharge (point source and combination of stormwater, SSO, and/or CSO), channelization, introduction of non-native organisms. Additionally, the Neponset River TMDL indicates that suspected sources of bacteria include sanitary sewer overflows, illicit sewer connections, storm water runoff, and failing septic systems.

Goals, Management Measures, and Funding: The primary goal of this WBP is to improve water quality and ultimately remove impaired waterbodies in the Town of Milton from the 303(d) list by 2042 and to address the Neponset River Watershed Bacteria TMDL. The interim goal is to reduce the TP loading in the Town of Milton subwatershed by 10% within the next five years. The goal is to also reduce *E. coli* concentrations within the Milton waterbodies to be equal to or less than the Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013). It is recommended to continue and expand water quality monitoring efforts (by the Neponset River Watershed Association (NepRWA), the Town of Milton, or other volunteer organizations) to identify if the implemented and proposed management measures (identified in Element C) result in improvements to water quality and to identify

[1] A Watershed-based Plan was developed for the Pine Tree Brook/Turners Pond watershed (Geosyntec, 2020) and can be accessed at the following link: [WBP - Accepted Plans (geosyntec.com)](https://).

future best management practice (BMP) sites. The long-term goals are to reduce TP and DO concentrations in all waterbodies in Milton to meet the water quality goals identified in Element A within the next 20 years (i.e., that TP should not exceed 50 ug/L in any stream or 25 ug/L within any pond, lake, or reservoir and that DO saturation should not be less than 5 milligrams per liter (mg/L) in warm water fisheries or less than 6 mg/L in cold water fisheries).

The Town of Milton has previously used Clean Water Act Section 319 Nonpoint Source Pollution Grant Program (Section 319) and Massachusetts Office of Coastal Zone Management funding to design and install BMPs to help improve water quality in the Unquity Brook and Pine Tree Brook watersheds. It is expected that funding and support for future management measures will be obtained from these sources in addition to Town Capital funds, volunteer efforts, and other sources.

Public Education and Outreach: Goals of public education and outreach are to provide information about proposed stormwater improvements and their anticipated benefits and to promote watershed stewardship. The Town of Milton and the NepRWA aim to engage watershed residents and businesses through interpretive signage, educational mailing, online resources, and a variety of other means. It is expected that these programs will be evaluated by tracking coverage from local media, number of mailers distributed, activity on online resources, and other tools applicable to the type of outreach performed. Past public education and outreach events held by NepRWA included river cleanup days and public education on yard waste, rain gardens, and septic systems. Public education and outreach events will continue to be held by NepRWA, the Town of Milton, and other volunteer organizations.

Implementation Schedule and Evaluation Criteria: Project activities will be implemented based on the information outlined in the following elements for monitoring, implementation of structural BMPs, public education and outreach activities, and periodic updates to the WBP. The WBP implementation schedule includes milestones for BMP implementation, monitoring, public education and outreach, and periodic updates to the WBP. It is expected that the water quality monitoring program will enable evaluation of improvements over time. Other indirect evaluation metrics are also recommended include quantification of potential pollutant load reductions from non-structural BMPs (e.g., street sweeping and catch basin cleaning). The WBP will be reevaluated and adjusted, as needed, once every three years.

What is a Watershed-Based Plan?

Purpose & Need

The purpose of a Massachusetts Watershed-Based Plan (WBP) is to organize information about Massachusetts' watersheds and present the information in a format that will enhance the development and implementation of projects that will restore water quality and beneficial uses in the Commonwealth. The Massachusetts WBP follows the United States Environmental Protection Agency's (EPA's) recommended format for "nine-element" watershed plans, as described below.

All states are required to develop WBPs in order to be eligible for federal watershed implementation grant funds under Section 319 of the Clean Water Act, but not all states have taken the same approach. Most states develop WBPs only for selected watersheds. Massachusetts Department of Environmental Protection's (MassDEP's) approach has been to develop a tool to support statewide development of WBPs so **that good projects in all areas of the state may be eligible for Clean Water Act Section 319 implementation grant funds.**

EPA guidelines promote the use of Section 319 funding for developing and implementing WBPs. WBPs are required for all projects implemented with Section 319 funds and are recommended for all watershed projects, whether they are designed to protect unimpaired waters, restore impaired waters, or both.

Watershed-Based Plan Outline

This WBP for the Town of Milton includes nine elements (a through i) in accordance with EPA Guidelines:

a) An **identification of the causes and sources** or groups of similar sources that will need to be controlled to achieve the load reductions estimated in this WBP and to achieve any other watershed goals identified in the WBP, as discussed in item (b) immediately below.

b) An **estimate of the load reductions** expected for the management measures described under paragraph (c) below, recognizing the natural variability and the difficulty in precisely predicting the performance of management measures over time.

c) A **description of the nonpoint source (NPS) management measures** needed to achieve the load reductions estimated under paragraph (b) above as well as to achieve other watershed goals identified in this WBP and an identification (using a map or a description) of the critical areas in which those measures will be needed to implement this plan.

d) An **estimate of the amounts of technical and financial assistance needed**, associated costs, and/or the sources and authorities that will be relied upon, to implement this plan. As sources of funding, States should consider the use of their Section 319 programs, State Revolving Funds, United States Department of Agriculture's (USDA's) Environmental Quality Incentives Program and Conservation Reserve Program, and other relevant federal, state, local, and private funds that may be available to assist in implementing this plan.

e) An **information/education component** that will be used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the NPS management measures that will be implemented.

f) A **schedule for implementing the NPS management measures** identified in this plan that is reasonably expeditious.

g) A description of **interim, measurable milestones** for determining whether NPS management measures or other control actions are being implemented.

h) A set of **criteria to determine if loading reductions are being achieved** over time and substantial progress is being made toward attaining water quality standards and, if not, the criteria for determining whether this WBP needs to be revised or, if a NPS total maximum daily load (TMDL) has been established, whether the TMDL needs to be revised.

i) A **monitoring component** to evaluate the effectiveness of the implementation efforts over time measured against the criteria established under item (h) immediately above.

Project Partners and Stakeholder Input

This WBP was developed by Geosyntec under the direction of the Town of Milton, Massachusetts, with funding, input, and collaboration from MassDEP. This WBP was developed using funds from the Section 319 program to assist grantees in developing technically robust WBPs using MassDEP's Watershed-Based Planning Tool (WBP Tool). The Town of Milton was a recipient of Section 319 funding in Fiscal Year 2021 to implement structural best management practices (BMPs) in the Unquity Brook watershed. The stakeholder coordination for this WBP was therefore focused on Unquity Brook watershed.

The following are core project stakeholders:

- Marina Fernandes – Town of Milton Department of Public Works (DPW)
- Chase Berkeley – Town of Milton DPW
- Meera Patel – Town of Milton DPW
- Lisa Ahern – Town of Milton Cemetery Department
- Steve Ivas – Town of Milton Conservation Commission
- Declan Devine – Neponset River Watershed Association (NepRWA)
- Jerry Burke – Town of Milton Resident
- Jimmy Coyne – Town of Milton Resident
- Jay (did not provide last name) – Town of Milton Resident
- Meghan Selby – MassDEP
- Judith Rondeau – MassDEP

This WBP was developed as part of an iterative process:

- First, the Geosyntec project team collected and reviewed existing data and reports for the Unquity Brook watershed received from the Town of Milton and other stakeholders.
- Next, a core stakeholder conference call was facilitated on December 13, 2021, to solicit input and gain consensus on elements included in the plan (identifying problem areas, BMP projects, water quality goals,

public outreach activities, etc.). The meeting minutes from the stakeholder conference call are included in **Appendix A**.

- Next, the Geosyntec project team reviewed additional data and reports for the other subwatersheds within the Town of Milton including the Pine Tree Brook WBP (Geosyntec, 2020).
- Finally, the preliminary WBP was then drafted and reviewed by MassDEP and finalized based on MassDEP input.

Data Sources

This WBP was developed using the framework and data sources provided by MassDEP's WBP Tool and supplemented by information provided in the Section 319 application for "Algerine Corner Stormwater BMP Construction" (Town of Milton 2021). Additional data sources were reviewed and are included in subsequent sections of this WBP.

Element A: Identify Causes of Impairment & Pollution Sources

Element A: Identify the causes and sources or groups of similar sources that need to be controlled to achieve the necessary pollutant load reductions estimated in the watershed based plan (WBP).

General Watershed Information

This WBP is for the entire Town of Milton. The Town of Milton is comprised of five subwatersheds (identified in this WBP as "Milton 1", "Milton 2", "Milton 3", "Milton 4", and "Milton 5") that are 8,438 acres in total area. **Table A-1** presents the general watershed information for the five subwatersheds within the Town of Milton, and **Figure A-1** includes a map of the subwatershed boundaries. The subwatersheds are mostly forested and residential (high, medium, and low-density) with smaller portions of agricultural and commercial land use.

A municipal separate storm system (MS4) is a system of stormwater infrastructure including catch basins, drain manholes, and stormwater pipes, and conveys stormwater that discharges to surface waters such as streams and ponds. An MS4 encompasses the entire Town of Milton. Major ponds and streams within the Town of Milton include Unquity Brook (MA73-26), Pine Tree Brook[2] (MA73-29), Trout Brook, Russell Pond (MA73003), Chestnut Run, Balster Brook, Blue Hill River, and Hoosiwhisick Pond (MA74015). The majority of the Town of Milton (subwatersheds Milton 3, Milton 4, and Milton 5) is within the Neponset River watershed. Subwatershed Milton 1 ultimately drains to Quincy Bay and does not include any significant receiving waterbodies within the Town of Milton. Subwatershed Milton 2 is within the Monatiquot River watershed.

Table A-1: Town of Milton Subwatershed Information

MS4 Subwatershed #	Waterbody Names (Assessment Unit ID)	MS4 Subwatershed Area (acres)	Major Basin
Milton 1	No Named Waterbodies	317 acres	Quincy Bay
Milton 2	Blue Hill River; Coon Hollow Brook; Hoosicwhisick Pond (MA74015)	747 acres	Monatiquot River
Milton 3	Neponset River (MA73-02)	574 acres	Neponset River
Milton 4	Balster Brook; Gulliver Creek (MA73-30); Neponset River (MA73-02); Neponset River (MA73-03); Neponset River (MA73-04); Pine Tree Brook (MA73-29); Turners Pond (MA73059); Unquity Brook (MA73-26)	3129 acres	Neponset River
Milton 5	Balster Brook; Chestnut Run; Pine Tree Brook (MA73-29); Russell Pond (MA73003); Trout Brook	3672 acres	Neponset River

[2] A Watershed-based Plan was developed for the Pine Tree Brook/Turners Pond watershed (Geosyntec 2020) and can be accessed at the following link: [WBP - Accepted Plans (geosyntec.com)](geosyntec.com).

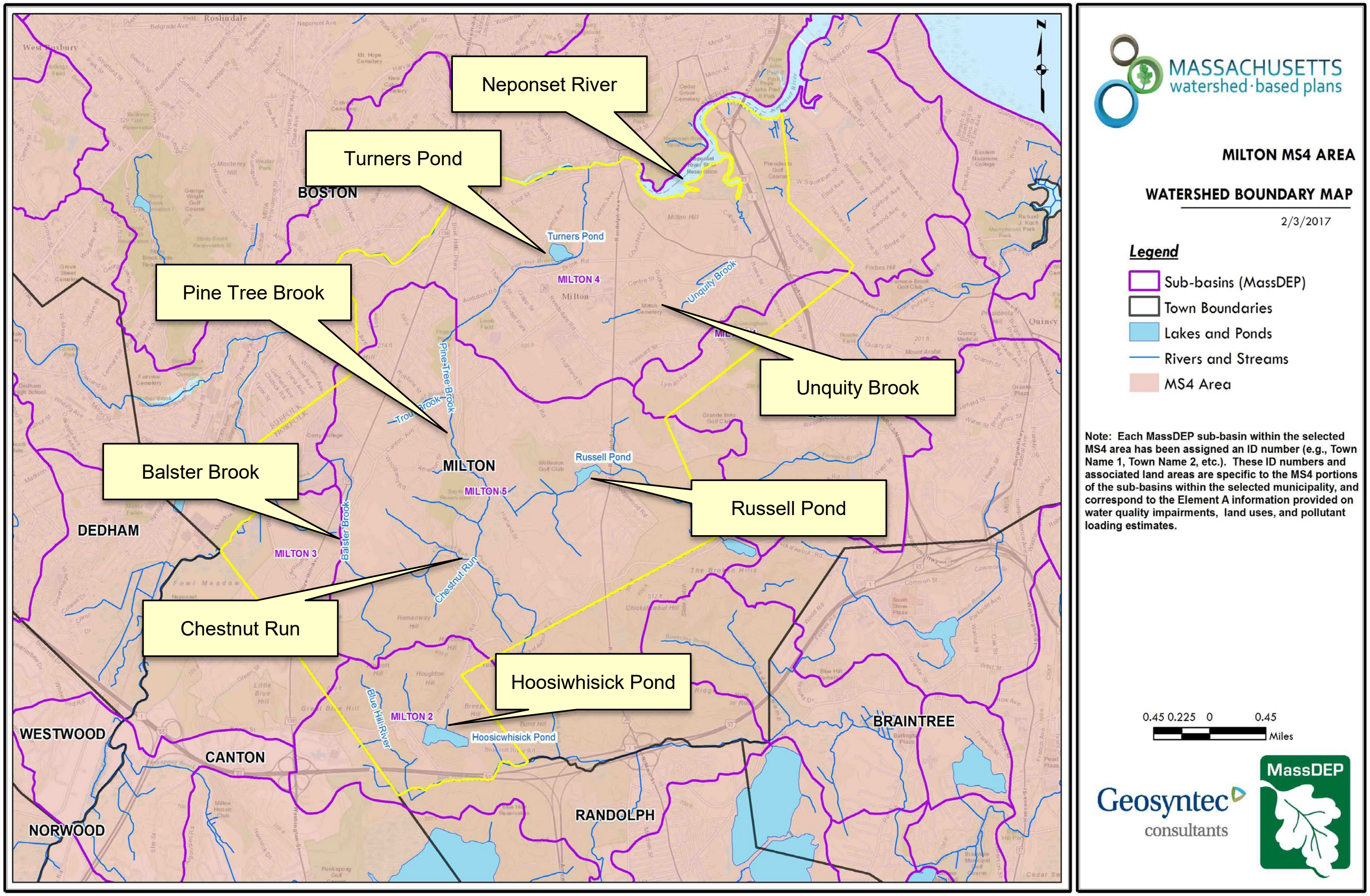


Figure A-1: Town of Milton Subwatershed Boundary Map (MassGIS, 2007; MassGIS, 1999; MassGIS, 2001; USGS, 2016)

MassDEP Water Quality Assessment Report and TMDL Review

The section below summarizes the findings of the available Water Quality Assessment Reports and/or TMDLs that relate to water quality and water quality impairments.

The following reports are available:

- Neponset River Watershed 2004 Water Quality Assessment Report (MassDEP, 2004)
- Total Maximum Daily Loads of Bacteria for Neponset River Basin (MassDEP, 2002)
- Weymouth and Weir River Basin 2004 Water Quality Assessment Report (MassDEP, 2004)

Select excerpts from the water quality assessment reports relating to the water quality in the subwatersheds are included below (note: relevant information is included directly from these documents for informational purposes and has not been modified). Additional information on the TMDL for Bacteria in the Neponset River Basin is included in **Appendix B**.

Neponset River Watershed 2004 Water Quality Assessment Report (MA73003 - Russell Pond)
Aquatic Life A non-native species (Potamogeton crispus) has been observed in Russell Pond. Fish Consumption This waterbody does not have a site-specific fish consumption advisory. All applicable statewide fish consumption advisories issued by MA DPH due to mercury contamination apply to this waterbody (See Special Note 2). Primary Contact Insufficient data were available to assess the Primary Contact Use. Secondary Contact Insufficient data were available to assess the Secondary Contact Use. Aesthetics Insufficient data were available to assess the Aesthetic Use. **Report Recommendations:** NA

Neponset River Watershed 2004 Water Quality Assessment Report (MA73-03 - Neponset River)
Aquatic Life In 2002, USGS conducted a study investigating the sediment and water quality in the Neponset River. As part of this study, USGS deployed passive water column samplers (PISCES) for polychlorinated biphenyls (PCB). USGS estimated dissolved PCB in the water column from the PISCES data and found that all eight sites in this segment had dissolved PCB concentrations 3 to 9 times higher than the continuous chronic criterion (CCC) set by EPA (14.0 ng/L). Fish Consumption MA DPH has issued a fish consumption advisory for the Neponset River due to polychlorinated biphenyls (PCB) contamination.

Children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant, and nursing mothers should not eat Brown Bullhead fish from this water body. The general public should limit consumption of Brown Bullhead fish to two meals per month (See Special Note 1 and 2).

Primary Contact
In 2002, USGS conducted a study investigating the sediment and water quality in the Neponset River. As part of this study, USGS deployed passive water column samplers (PISCES) for PCB. Using data from the PISCES, USGS calculated the toxicity equivalency of the 13 "dioxin-like" PCB congener, expressed as 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). All eight sites in this segment had estimated dissolved PCB concentrations, expressed as TCDD, greater than the EPA human health standard (0.005 pg/L). NepRWA collected *E. coli* samples at two sites in 2007 and 2008. The annual geometric means of the samples collected at each site during the primary contact season ranged from 271 CFU/100ml to 310 CFU/100ml. MWRA collected *E. coli* and Enterococcus at one site from 2003 to 2007. The annual geometric means of the samples collected during the primary contact season at each site ranged from 285 CFU/100ml to 626 CFU/100ml for *E.coli* and 34 CFU/100ml to 299 CFU/100ml for Enterococcus. These results violate the geometric mean criterion for *E. coli* (126 CFU/100ml) and Enterococcus (33 CFU/100ml).

Secondary Contact
NepRWA collected *E. coli* samples at two sites in 2007 and 2008. The annual geometric means of the samples collected at each site ranged from 273 CFU/100ml to 410 CFU/100ml. MWRA collected *E. coli* and Enterococcus at one site from 2003 to 2007. The annual geometric means of the samples collected at each site ranged from 306 CFU/100ml to 441 CFU/100ml for *E.coli* and 41 CFU/100ml to 273 CFU/100ml for Enterococcus. These results do not violate the geometric mean criterion (630 CFU/100ml) for *E. coli*. An Alert Status is identified for this use due to occasional spikes in *E.coli* concentrations.

Aesthetics
Insufficient data were available to assess the Aesthetic Use.

Report Recommendations:
NA

Neponset River Watershed 2004 Water Quality Assessment Report (MA73-30 - Gulliver Creek)

Aquatic Life
Insufficient data were available to assess the Aquatic Life Use.

Fish Consumption
MA DPH has issued a fish consumption advisory for Boston Harbor due to polychlorinated biphenyls (PCB) and other contaminants. Pregnant women, women who may become pregnant, nursing mothers and children under 12 years old should not eat lobsters, flounder, soft-shell clams and bivalves from Boston Harbor. Boston Harbor is broadly defined to include all coastal waters that drain into it for the purpose of fish consumption assessment (See Special Note 1 and 2 and 2).

Shellfish
MA DMF does not classify any shellfishing areas in this segment so the Shellfishing Use is not assessed.

Primary Contact
Insufficient data were available to assess the Primary Contact Use.

Secondary Contact
Insufficient data were available to assess the Secondary Contact Use.

Aesthetics
Insufficient data were available to assess the Aesthetic Use.

Report Recommendations:
NA

Neponset River Watershed 2004 Water Quality Assessment Report (MA73-04 - Neponset River)
Aquatic Life Insufficient data were available to assess the Aquatic Life Use. Fish Consumption MA DPH has issued a fish consumption advisory for Boston Harbor due to polychlorinated biphenyls (PCB) and other contaminants. Pregnant women, women who may become pregnant, nursing mothers and children under 12 years old should not eat lobsters, flounder, soft-shell clams and bivalves from Boston Harbor. Boston Harbor is broadly defined to include all coastal waters that drain into it for the purpose of fish consumption assessment (See Special Note 1 and 2 and 2). Shellfish This segment contains portions of MA DMF's Designated Shellfish Growing Areas GBH3.0, GBH3.3 and GBH3.4. The shellfishing in all three growing areas is classified by MA DMF as Prohibited. Primary Contact MWRA collected Enterococcus at five sites from 2003 to 2007. The annual geometric means of the samples collected during the primary contact season at each site ranged from 10 CFU/100ml to 271 CFU/100ml. These results violate the geometric mean criterion (33 CFU/100ml) for Enterococcus. Secondary Contact MWRA collected Enterococcus at five sites from 2003 to 2007. The annual geometric means of the samples collected at each site ranged from 12 CFU/100ml to 295 CFU/100ml. These violate the geometric mean criterion (175 CFU/100ml) for E. coli. Aesthetics Insufficient data were available to assess the Aesthetic Use. **Report Recommendations:** NA

Neponset River Watershed 2004 Water Quality Assessment Report (MA73-26 - Unquity Brook)
Aquatic Life Insufficient data were available to assess the Aquatic Life Use. Fish Consumption This waterbody does not have a site-specific fish consumption advisory. All applicable statewide fish consumption advisories issued by MA DPH due to mercury contamination apply to this waterbody (See Special Note 2). Primary Contact NepRWA collected *E. coli* samples at two sites in 2007 and three sites in 2008. The annual geometric means of the samples collected at each site during the primary contact season ranged from 427 CFU/100ml to 938 CFU/100ml. These results violate the geometric mean criterion (126 CFU/100ml) for *E. coli*. Secondary Contact NepRWA collected *E. coli* samples at two sites in 2007 and three sites in 2008. The annual geometric means of the samples collected at each site ranged from 449 CFU/100ml to 938 CFU/100ml. These results violate the geometric mean criterion (630 CFU/100ml) for *E. coli*. Aesthetics Insufficient data were available to assess the Aesthetic Use.

Report Recommendations:
NA

Neponset River Watershed 2004 Water Quality Assessment Report (MA73-29 - Pine Tree Brook)

Aquatic Life
NepRWA measured dissolved oxygen at three sites in 2007 and 2008 (n=27) and found seven violations of the dissolved oxygen criterion (5.0 mg/L). The violations ranged from 2.1 mg/L to 4.9 mg/L. MA DFG collected fish at one site in 2002. The sample was dominated by individuals classified as macrohabitat generalist and pollution tolerant.

Fish Consumption
This waterbody does not have a site-specific fish consumption advisory. All applicable statewide fish consumption advisories issued by MA DPH due to mercury contamination apply to this waterbody (See Special Note 2).

Primary Contact
NepRWA collected *E. coli* samples at one site in 2007 and two sites in 2008. The annual geometric means of the samples collected at each site during the primary contact season ranged from 54 CFU/100ml to 507 CFU/100ml. MassDEP SERO collected *E. coli* samples at four sites in 2006. The annual geometric means of the samples collected at each site during the primary contact season ranged from 96 CFU/100ml to 345 CFU/100ml. These results violate the geometric mean criterion (126 CFU/100ml) for *E. coli*.

Secondary Contact
NepRWA collected *E. coli* samples at three sites in 2007 and 2008. The annual geometric means of the samples collected at each site ranged from 54 CFU/100ml to 538 CFU/100ml. MassDEP SERO collected *E. coli* samples at four sites in 2006. The annual geometric means of the samples collected at each site during the primary contact season ranged from 96 CFU/100ml to 345 CFU/100ml. These results do not violate the geometric mean criterion (630 CFU/100ml) for *E. coli*. An Alert Status is identified for this use due to occasional spikes in *E.coli* concentrations.

Aesthetics
Insufficient data were available to assess the Aesthetic Use.

Report Recommendations:
NA

Neponset River Watershed 2004 Water Quality Assessment Report (MA73-02 - Neponset River)

Aquatic Life
NepRWA measured dissolved oxygen at two sites in 2007 and 2008 (n=20) and found nine violations of the dissolved oxygen criterion (5.0 mg/L). The violations ranged from 3.3 mg/L to 4.9 mg/L.

Fish Consumption
MA DPH has issued a fish consumption advisory for the Neponset River due to polychlorinated biphenyls (PCB) contamination. Children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant, and nursing mothers should not eat Brown Bullhead fish from this water body. The general public should limit consumption of Brown Bullhead fish to two meals per month (See Special Note 1 and 2).

Primary Contact
NepRWA collected *E. coli* samples at two sites in 2007 and 2008. The annual geometric means of the samples collected at each site during the primary contact season ranged from 112 CFU/100ml to 276 CFU/100ml. These results violate the geometric

mean criterion (126 CFU/100ml) for *E. coli*. Secondary Contact NepRWA collected *E. coli* samples at two sites in 2007 and 2008. The annual geometric means of the samples collected at each site ranged from 117 CFU/100ml to 276 CFU/100ml. These results do not violate the geometric mean criterion (630 CFU/100ml) for *E. coli*. Aesthetics Insufficient data were available to assess the Aesthetic Use. **Report Recommendations:** NA

Weymouth and Weir River Basin 2004 Water Quality Assessment Report (MA74015 - Hoosicwhisick Pond)
Aquatic Life Insufficient data were available to assess the Aquatic Life Use. Fish Consumption This waterbody does not have a site-specific fish consumption advisory. All applicable statewide fish consumption advisories issued by MA DPH due to mercury contamination apply to this waterbody (See Special Note 1). Primary Contact Insufficient data were available to assess the Primary Contact Use. Secondary Contact Insufficient data were available to assess the Secondary Contact Use. Aesthetics Insufficient data were available to assess the Aesthetics Use. **Report Recommendations:** NA

Additional Water Quality Data

MassDEP Water Quality Monitoring Program Data

Historical and current Technical Memoranda (TM) produced by the MassDEP Watershed Planning Program (WPP) are available here: Water Quality Technical Memoranda | Mass.gov[3] and are organized by major watersheds in Massachusetts. Most of these TMs present the water chemistry and biological sampling results of WPP monitoring surveys. The TMs pertaining primarily to biological information (e.g., benthic macroinvertebrates, periphyton, fish populations) contain biological data and metrics that are currently not reported elsewhere. The data contained in the water quality TMs are also provided on the "Data" page (Water Quality Monitoring Program Data | Mass.gov[4]). Many of these TMs have helped inform Clean Water Act 305(b) assessment and 303(d) listing decisions. Water quality monitoring data is available for the Pine Tree Brook and Unquity Brook within the Town

[3] https://www.mass.gov/guides/water-quality-technical-memoranda
[4] https://www.mass.gov/water-quality-monitoring-program-data

of Milton from the years 2006, 2009, and 2013 for Pine Tree Brook and 2009 for Unquity Brook (MassDEP, 2020). *E. coli* data is presented in **Table A-2**. All of the sampling locations exceeded the Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013) for *E. coli*, which states that the geometric mean of samples from the most recent 6 months shall not exceed 126 colonies per 100 milliliters (typically based on a minimum of 5 samples) and no single sample shall exceed 235 colonies per 100 milliliters. The Total Phosphorus (TP) data is presented in **Table A-3**; one of the samples in Pine Tree Brook and one of the samples in Unquity Brook exceeded the TP EPA "Gold Book" (EPA, 1986) standard of 50 micrograms per liter (µg/L).

Table A-2: Water Quality (*E. coli*) Data in Pine Tree Brook and Unquity Brook, Milton, MA (MassDEP 2020)

Waterbody	Station ID	Description	Date	*E. coli* (CFU/100mL) Grab Sample Result	Geometric Mean (CFU/100mL)
Pine Tree Brook	W0573	[Eliot Street crossing, (Milton Village) Milton]	5/9/2006	118	373
			6/6/2006	214	
			6/26/2006	613	
			7/11/2006	548	
Pine Tree Brook	W0574	[Central Avenue, Milton]	5/9/2006	44	179
			6/6/2006	222	
			6/26/2006	272	
			7/11/2006	172	
			8/23/2006	185	
Pine Tree Brook	W0575	[Blue Hills Parkway, Milton]	5/9/2006	14	199
			6/6/2006	194	
			6/26/2006	345	
			7/11/2006	79	
			8/23/2006	365	
Pine Tree Brook	W0576	[Unquity Road (near Harland Street), Milton]	5/9/2006	20	126
			6/6/2006	133	
			6/26/2006	151	
			7/11/2006	86	
			8/23/2006	238	
Pine Tree Brook	W1624	[School Street, Milton]	8/23/2006	579	579
Pine Tree Brook	W0573	[Eliot Street crossing, (Milton Village) Milton]	4/28/2009	30	1,048
			6/2/2009	560	
			7/7/2009	4,900	
			8/11/2009	360	
			8/27/2009	230	
			9/15/2009	210	
Pine Tree Brook	W2385	[approximately 500 feet upstream/south	5/30/2013	410	173
			6/27/2013	85	
			8/1/2013	185	

Waterbody	Station ID	Description	Date	*E. coli* (CFU/100mL) Grab Sample Result	Geometric Mean (CFU/100mL)
		from Canton Avenue, Milton]	8/29/2013	134	
			9/25/2013	52	
Unquity Brook	UQ01	[Rowe Street (just south of Adams Street), Milton]	4/28/2009	430	3,505
			6/2/2009	1,000	
			7/7/2009	8,000	
			8/11/2009	2,600	
			8/27/2009	1,000	
			9/15/2009	8,000	

Source: MassDEP, 2020

"CFU/100 mL"= colony forming units per 100 milliliters

Table A-3: MassDEP Water Quality Monitoring Program TP Data for Pine Tree Brook and Unquity Brook

Waterbody	Unique ID	Sampling Location	Date	TP (µg/L)
Pine Tree Brook	W0573	[Eliot Street crossing, (Milton Village) Milton]	4/28/2009	22
			6/2/2009	23
			7/7/2009	77
			8/11/2009	21
			9/15/2009	27
Pine Tree Brook	W2385	[approximately 500 feet upstream/south from Canton Avenue, Milton]	5/30/2013	31
			6/27/2013	49
			8/1/2013	31
			9/25/2013	19
Unquity Brook	W0579	[Rowe Street (just south of Adams Street), Milton]	6/2/2009	20
			7/7/2009	240
			8/11/2009	20
			9/15/2009	23

Sources: MassDEP, 2020
"µg/L" = micrograms per Liter

Unquity Brook Assessment Project Data (NepRWA 2016)

Water quality data was collected from Unquity Brook as part of the Unquity Brook Assessment Project (NepRWA 2016). Both wet and dry weather samples were collected from 18 locations along Unquity Brook shown in **Figure A-2**, on May 12, June 2, and June 5, 2016. The sampling results are included in **Figure A-3**. In addition, microbial source tracking (MST) was used to indicate the presence or absence of various sources of *E. coli* to determine if the pathogen sources had human, dog, or a combination origin. The MST results are shown in **Table A-4** and **Table A-5**.

The water quality results indicated that stormwater runoff is negatively impacting water quality in Unquity Brook, as water temperature, *E. coli*, ammonia, TSS, and turbidity increased after a precipitation event. Conductivity and salinity decreased after a precipitation event. In particular, the TSS and turbidity results indicated sedimentation/erosion issues within the Unquity Brook watershed. Furthermore, the *E. coli* and MST data indicated that sewage contamination was occurring near the Milton police station and within the culvert under Brook Road. *E.coli* contamination is also a severe problem during wet weather. Not a single site sampled was below the single sample maximum for *E. coli* of the Massachusetts Surface Water Quality Standards.

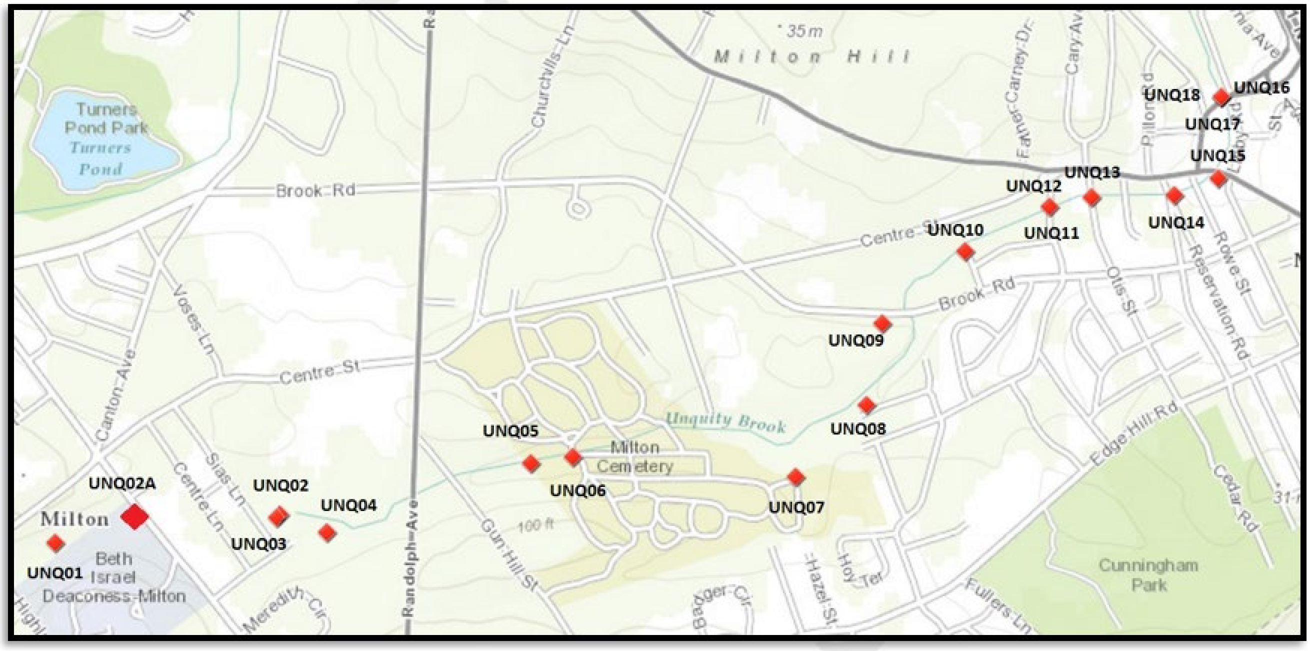


Figure A-2: Map of 18 Wet and Dry Weather Sampling Locations in Unquity Brook (NepRWA 2016)

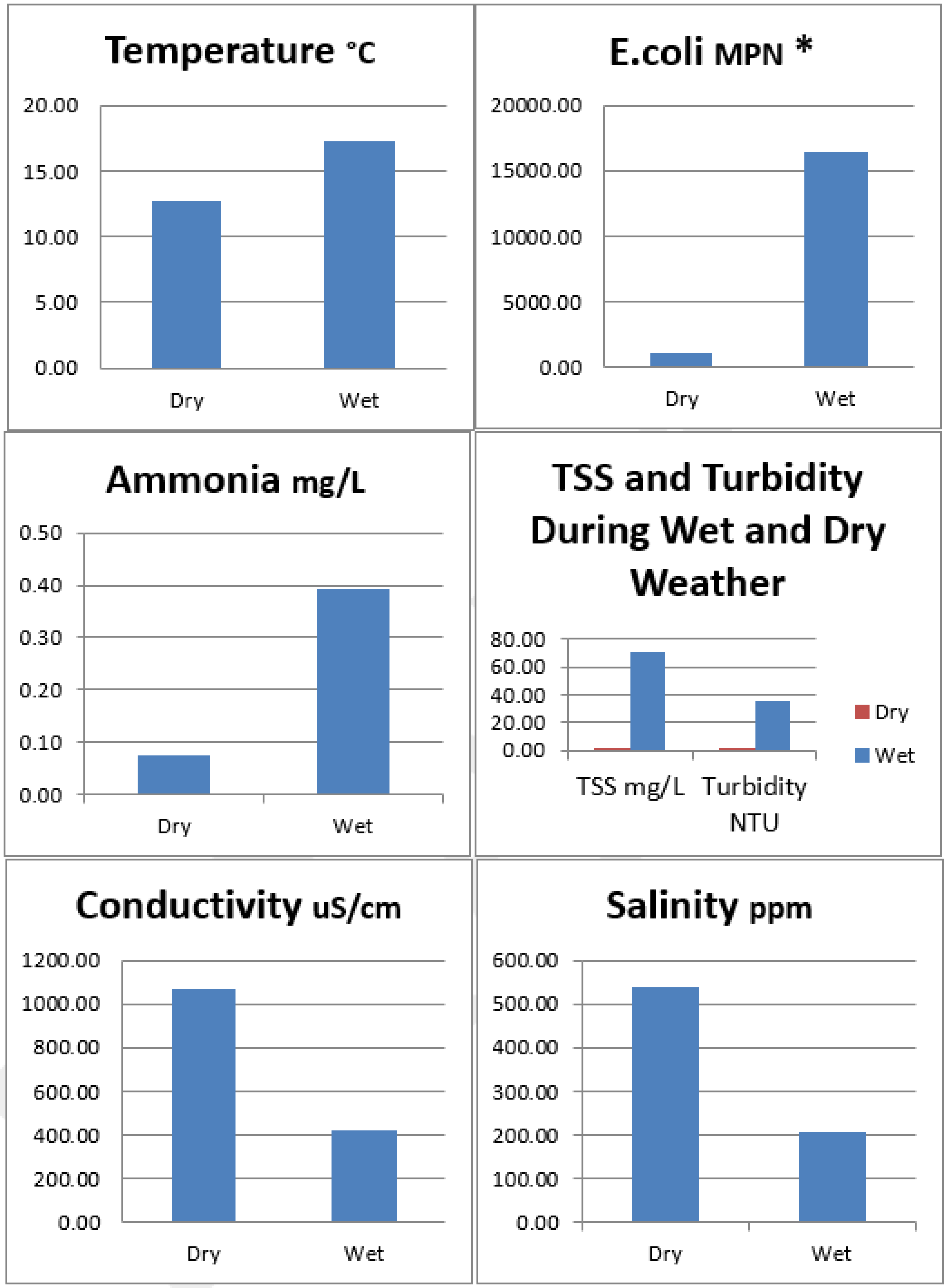


Figure A-3: Bar graphs displaying the mean values during wet and dry weather for temperature, *E. coli*, ammonia, TSS and Turbidity, Conductivity, and Salinity from 18 Dry and Wet Weather Sampling Locations in Unquity Brook (NepRWA 2016).

*** The maximum value for *E. coli* during dry weather was >2419.6 because no dilutions were used during this round of sampling. 1:10 dilutions were used during wet weather allowing for a maximum value of >24,196.**

(Samples were taken on May 12 [dry weather], June 2 [dry weather], and June 5, 2016 [wet weather] at all possible sampling locations in Unquity Brook)

Table A-4: Presence/Absence Results from Microbial Source Tracking (Dry Weather) (NepRWA 2016)

(Samples were taken on May 12 and June 2, 2016)

Dry Sampling Station	UNQ10	UNQ15	UNQ17
Human	Present	Present	Present

Table A-5: Presence/Absence Results from Microbial Source Tracking (NepRWA 2016)

(Samples were taken on June 5, 2016 [wet weather, 0.78 inches of precipitation)

Wet Sampling Station	UNQ03	UNQ04	UNQ08	UNQ09	UNQ11A	UNQ16	UNQ18
Human	Present	Present	Absent	Absent	Present	Present	Absent
Dog	Present	Present	Present	Present	Present	Present	Present

NepRWA's Citizen Water Monitoring Network (CWMN) and Hotspot Program (NepRWA, 2021a)

The NepRWA's Citizen Water Monitoring Network (CWMN) has been collecting water quality data throughout the Neponset River Watershed since 1994. Sampling sites are visited once a month between May and October and are assessed for numerous parameters including TP, DO, and *E. coli*.

The CWMN includes 9 sampling locations within the Town of Milton (UNB014, UNB16, UNB002, NER200, NER185, NER179, PTB047, PTB035, PTB028) located along Unquity Brook, Pine Tree Brook, and Neponset River (see **Figure A-4** for locations). *E. coli* values with a geometric mean less than 126 most probable number (MPN) are considered safe for swimming, *E. coli* values with a geometric mean less than 630 MPN are considered safe for boating, and *E. coli* values with a geometric mean above 630 MPN are not considered safe for swimming nor boating. TP levels of less than 0.05 milligrams per liter (mg/L) for streams and 0.025 mg/L for ponds are considered healthy. Concerning levels of TP are between 0.05 and 0.1 mg/L for streams and between 0.025 and 0.05 mg/L for ponds. TP levels of above 0.1 mg/L for streams and 0.05 mg/L for ponds are considered harmful. DO levels greater than 5.0 mg/L are considered healthy for fish and less than 5.0 mg/L are considered unhealthy.

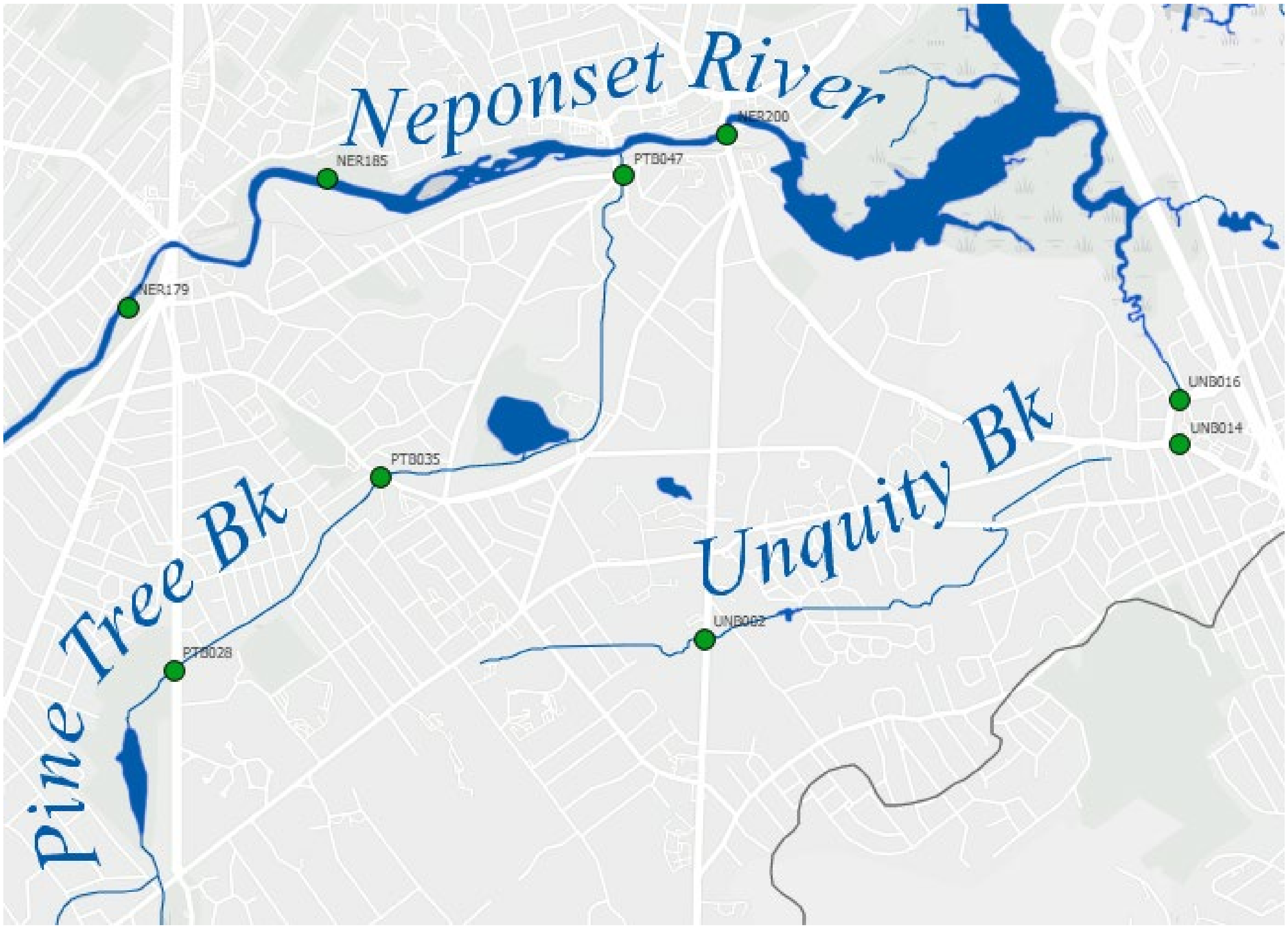


Figure A-4. CWMN Water Quality Monitoring Locations (UNB016, UNB014, UNB002, PTB028, PTB035, PTB047, NER200, NER185, NER179) along Unquity Brook, Pine Tree Brook, and the Neponset River within the Town of Milton, MA

(Source: www.neponset.org/your-watershed/cwmn-data/)

Table A-6—A-14 present the NepRWA CWMN data for 2013—2021. The Neponset River *E. coli* results indicated water quality was generally safe for boating but not for swimming, with only a few samples not safe for either activity. Levels of TP were either healthy or concerning, with few harmful results. The DO levels were in the healthy range. The Unquity Brook *E. coli* results were generally unsafe for both boating and swimming, with a few results indicating that the brook was safe for boating. The upstream Unquity Brook samples had healthy or concerning levels of TP, while the downstream site (UNB002) had mostly harmful levels of TP. Similarly, the upstream Unquity Brook samples indicated healthy DO levels, while the downstream site had both healthy and unhealthy sample results. The *E. coli* results for Pine Tree Brook were safe for boating and occasionally safe for swimming at the downstream location (PB028) but were not safe for swimming or boating or just safe for boating in the upstream locations (PB035 and PB047). The TP levels at all three locations were mostly healthy or concerning, with only a few harmful levels. The DO levels at the upstream site (PTB047) were considered healthy, but the downstream sites showed a mix of healthy and unhealthy dissolved oxygen levels. All of the sampling locations had exceedances of the Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013) for *E. coli*, which states that the geometric mean of samples from the most recent 6 months shall not exceed 126 colonies per 100 milliliters (typically based on a minimum of 5 samples) and no single sample shall exceed 235 colonies per 100 milliliters. All of the sampling locations also had exceedances of the TP EPA "Gold Book" (EPA, 1986) standard of 50 micrograms per liter (µg/L).

Table A-6: Water Quality Data at Sampling Location UNB016

(Samples were taken once per month from May—October (6 samples per year))

(Source: www.neponset.org/your-watershed/cwmn-data/)

Year	E. coli (Geometric Mean - colonies/100 ml)	Total Phosphorus (mg/L)	Average Dissolved Oxygen (mg/L)
2013	373	0.052	8.7
2014	948	0.080	7.6
2015	818	0.049	8.4
2016	510	0.047	8.1
2017	458	0.053	8.2
2018	464	0.059	8.7
2019	1,438	0.070	9.0
2020	363	0.089	9.0
2021	1,085	0.083	9.2

Table A-7: Water Quality Data at Sampling Location UNB014

(Samples were taken once per month from May—October (6 samples per year))

(Source: www.neponset.org/your-watershed/cwmn-data/)

Year	*E. coli* (Geometric Mean - colonies/100 ml)	Total Phosphorus (mg/L)	Dissolved Oxygen (mg/L)
2013	516	0.046	8.6
2014	1,444	0.080	7.9
2015	1,079	0.046	8.0
2016	624	0.048	8.2
2017	910	0.050	8.4
2018	1,445	0.056	8.1
2019	1,481	0.070	8.3
2020	532	0.067	8.9
2021	1,903	0.099	8.6

Table A-8: Water Quality Data at Sampling Location UNB002

(Samples were taken once per month from May—October (6 samples per year))

(Source: www.neponset.org/your-watershed/cwmn-data/)

Year	*E. coli* (Geometric Mean - colonies/100 ml)	Total Phosphorus (mg/L)	Dissolved Oxygen (mg/L)
2013	162	0.227	6.0
2014	530	0.168	4.0
2015	896	0.080	5.2
2016	176	0.208	5.1
2017	644	0.088	3.3
2018	2,357	0.102	5.0
2019	2,423	0.140	5.3
2020	1,715	0.252	5.2
2021	907	0.098	6.8

Table A-9: Water Quality Data at Sampling Location NER200

(Samples were taken once per month from May—October (6 samples per year))

(Source: www.neponset.org/your-watershed/cwmn-data/)

Year	*E. coli* (Geometric Mean - colonies/100 ml)	Total Phosphorus (mg/L)	Average Dissolved Oxygen (mg/L)
2013	312	0.055	8.8
2014	1,373	0.080	6.9
2015	566	0.051	8.1
2016	298	0.034	7.3
2017	275	0.047	8.0
2018	365	0.051	8.3
2019	253	0.060	8.6
2020	144	0.060	7.6
2021	213	0.063	8.1

Table A-10: Water Quality Data at Sampling Location NER185

(Samples were taken once per month from May—October (6 samples per year))

(Source: www.neponset.org/your-watershed/cwmn-data/)

Year	*E. coli* (Geometric Mean - colonies/100 ml)	Total Phosphorus (mg/L)	Dissolved Oxygen (mg/L)
2013	190	0.072	7.6
2014	551	0.101	7.4
2015	570	0.089	8.0
2016	364	0.087	7.1
2017	446	0.046	8.3
2018	349	0.048	7.5
2019	377	0.070	8.0
2020	408	0.060	7.8
2021	219	0.065	7.8

Table A-11: Water Quality Data at Sampling Location NER179

(Samples were taken once per month from May—October (6 samples per year))

(Source: www.neponset.org/your-watershed/cwmn-data/)

Year	*E. coli* (Geometric Mean - colonies/100 ml)	Total Phosphorus (mg/L)	Dissolved Oxygen (mg/L)
2013	347	0.063	6.2
2014	491	0.050	6.9
2015	536	0.053	6.9
2016	227	0.038	6.4
2017	103	0.044	8.1
2018	135	0.049	7.2
2019	265	0.060	8.8
2020	239	0.065	7.3
2021	222	0.066	7.7

Table A-12: Water Quality Data at Sampling Location PTB028

(Samples were taken once per month from May—October (6 samples per year))

(Source: www.neponset.org/your-watershed/cwmn-data/)

Year	*E. coli* (Geometric Mean - colonies/100 ml)	Average Total Phosphorus (mg/L)	Average Dissolved Oxygen (mg/L)
2013	70	0.039	7.6
2014	381	0.068	3.6
2015	172	0.042	6.0
2016	182	0.077	5.3
2017	112	0.045	4.8
2018	153	0.052	6.1
2019	318	0.060	6.5
2020	167	0.078	5.4
2021	217	0.073	6.5

Table A-13: Water Quality Data at Sampling Location PTB035

(Samples were taken once per month from May—October (6 samples per year))

(Source: www.neponset.org/your-watershed/cwmn-data/)

Year	*E. coli* (Geometric Mean - colonies/100 ml)	Total Phosphorus (mg/L)	Dissolved Oxygen (mg/L)
2013	168	0.040	7.3
2014	1,330	0.093	4.8
2015	735	0.066	6.3
2016	976	0.248	5.0
2017	775	0.055	5.9
2018	356	0.061	6.4
2019	523	0.090	6.7
2020	431	0.153	6.3
2021	486	0.068	6.9

Table A-14: Water Quality Data at Sampling Location PTB047
(Samples were taken once per month from May—October (6 samples per year))
(Source: www.neponset.org/your-watershed/cwmn-data/)

Year	*E. coli* (Geometric Mean - colonies/100 ml)	Total Phosphorus (mg/L)	Dissolved Oxygen (mg/L)
2013	276	0.041	7.8
2014	892	0.052	7.7
2015	632	0.041	8.0
2016	502	0.039	8.0
2017	439	0.045	7.7
2018	994	0.062	7.5
2019	515	0.050	8.4
2020	822	0.082	7.6
2021	840	0.057	7.6

Hot Spot Monitoring (NepRWA, 2021b)

Additional sampling was also conducted in 2016—2018 at numerous locations on the downstream section of Pine Tree Brook as well as along Unquity Brook, which was part of the NepRWA's Hotspot Program. **Figure A-5** indicates where the sampling locations were located. The green locations had *E. coli* results with a geometric mean less than 126 colonies/100 ml; the yellow locations had *E. coli* results with a geometric mean between 126—630 colonies/100 ml. The red locations had *E. coli* results greater than 630 colonies/100 ml.

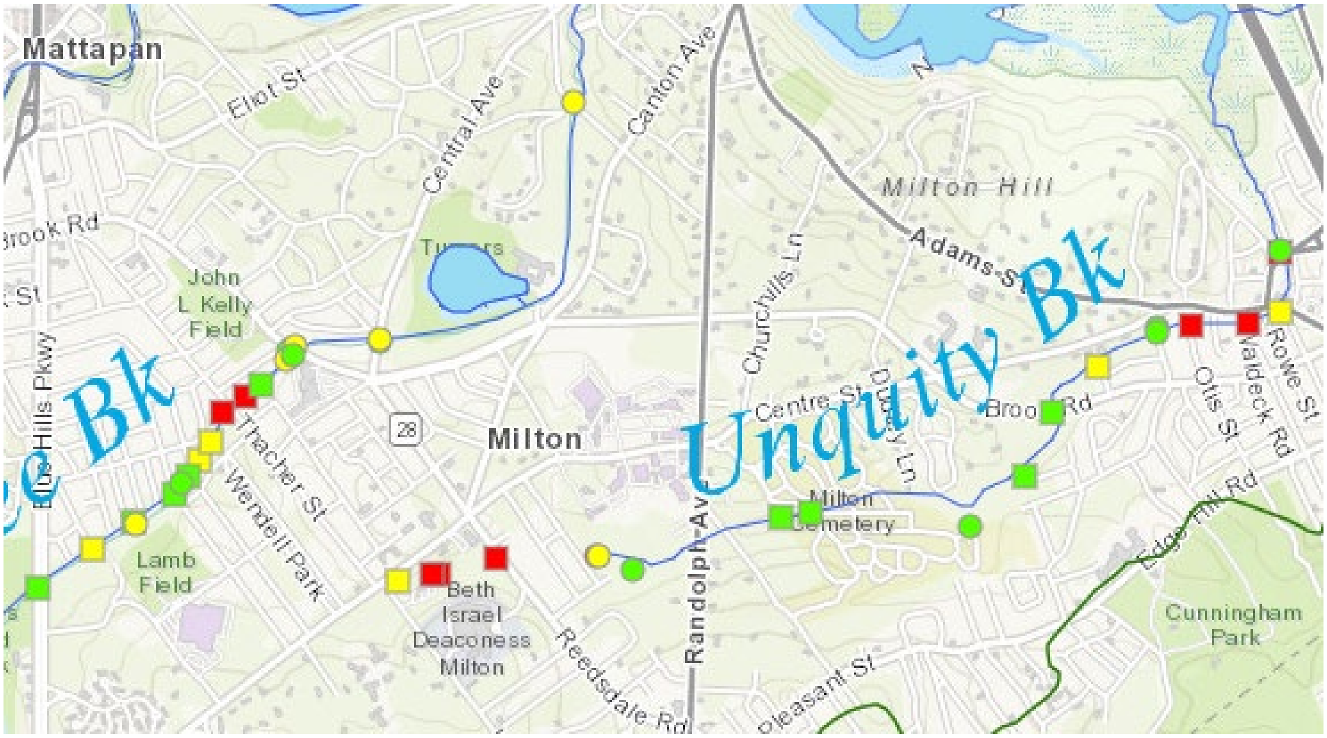


Figure A-5. CWMN Hotspot Monitoring Locations along Pine Tree Brook and Unquity Brook between 2016—2018 (The green locations had *E. coli* results with a geometric mean less than 126 colonies/100 ml; the yellow locations had *E. coli* results with a geometric mean between 126—630 colonies/100 ml. The red locations had *E. coli* results greater than 630 colonies/100 ml).

(Source: www.neponset.org/projects/hot-spot-program/)

Water Quality Impairments

Impairment categories from the Massachusetts Year 2016 Integrated List of Waters (303(d) list) are identified in **Table A-15**.

Table A-15: 2016 MA Integrated List of Waters Categories

Integrated List Category	Description
1	Unimpaired and not threatened for all designated uses.
2	Unimpaired for some uses and not assessed for others.
3	Insufficient information to make assessments for any uses.
4	Impaired or threatened for one or more uses, but not requiring calculation of a Total Maximum Daily Load (TMDL), including: 4a: TMDL is completed 4b: Impairment controlled by alternative pollution control requirements 4c: Impairment not caused by a pollutant – TMDL not required
5	Impaired or threatened for one or more uses and requiring preparation of a TMDL.

Segments of the Neponset River, Pine Tree Brook, Turners Pond, Unquity Brook, Gulliver Creek, and Russell Pond are identified as category 5 waterbodies on the (303(d) list due to multiple impairments including turbidity, debris, flocculant masses, oil and grease, scum/foam, trash, DDT in fish tissue, PCBs in fish tissue, DO, metals, *E. coli*, fecal coliform, physical substrate habitat alterations, aquatic plants (macrophytes), PCBs, enterococcus, nutrient/eutrophication (biological indicators), dewatering, low pH, TP, sedimentation/siltation, and non-native aquatic plants. All of the impaired waterbodies within the Town of Milton are also within the Neponset River watershed (subwatersheds Milton 3, Milton 4, and Milton 5).Known water quality impairments and sources for these waterbodies, as documented in the 303(d) list, are listed in **Table A-16—A-18** by subwatershed. Sources of these impairments include illegal dumping or other inappropriate waste disposal, discharges from municipal separate storm sewer systems (MS4s), contaminated sediments, combined sewer overflows (CSOs), wet weather discharge (point source and combination of stormwater, SSO, and/or CSO), channelization, and introduction of non-native organisms. There are no known impaired waters in subwatersheds Milton 1 and Milton 2.

Table A-16: Water Quality Impairments in the Town of Milton Subwatershed #: Milton 3 (MassDEP 2019)

Assessment Unit ID	Waterbody	Integrated List Category	Designated Use	Impairment Cause	Impairment Source
MA73-02	**Neponset River**	**5**	Secondary Contact Recreation	Turbidity	Source Unknown
MA73-02	**Neponset River**	**5**	Aesthetic	Debris	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-02	**Neponset River**	**5**	Aesthetic	Flocculant Masses	Source Unknown
MA73-02	**Neponset River**	**5**	Aesthetic	Oil and Grease	Source Unknown
MA73-02	**Neponset River**	**5**	Aesthetic	Scum/Foam	Source Unknown
MA73-02	**Neponset River**	**5**	Aesthetic	Trash	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-02	**Neponset River**	**5**	Aesthetic	Turbidity	Source Unknown
MA73-02	**Neponset River**	**5**	Fish Consumption	DDT in Fish Tissue	Source Unknown
MA73-02	**Neponset River**	**5**	Fish Consumption	PCBs In Fish Tissue	Source Unknown
MA73-02	**Neponset River**	**5**	Fish, other Aquatic Life and Wildlife	Dissolved Oxygen	Source Unknown
MA73-02	**Neponset River**	**5**	Fish, other Aquatic Life and Wildlife	Metals	Source Unknown
MA73-02	**Neponset River**	**5**	Primary Contact Recreation	Debris	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-02	**Neponset River**	**5**	Primary Contact Recreation	Escherichia coli (E. coli)	Source Unknown
MA73-02	**Neponset River**	**5**	Primary Contact Recreation	Fecal Coliform	Source Unknown
MA73-02	**Neponset River**	**5**	Primary Contact Recreation	Flocculant Masses	Source Unknown
MA73-02	**Neponset River**	**5**	Primary Contact Recreation	Oil and Grease	Source Unknown
MA73-02	**Neponset River**	**5**	Primary Contact Recreation	Scum/Foam	Source Unknown
MA73-02	**Neponset River**	**5**	Primary Contact Recreation	Trash	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-02	**Neponset River**	**5**	Primary Contact Recreation	Turbidity	Source Unknown
MA73-02	**Neponset River**	**5**	Secondary Contact Recreation	Debris	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-02	**Neponset River**	**5**	Secondary Contact Recreation	Flocculant Masses	Source Unknown
MA73-02	**Neponset River**	**5**	Secondary Contact Recreation	Oil and Grease	Source Unknown
MA73-02	**Neponset River**	**5**	Secondary Contact Recreation	Scum/Foam	Source Unknown
MA73-02	**Neponset River**	**5**	Secondary Contact Recreation	Trash	Illegal Dumps or Other Inappropriate Waste Disposal

Table A-17: Water Quality Impairments in the Town of Milton Subwatershed #: Milton 4 (MassDEP 2019)

Assessment Unit ID	Waterbody	Integrated List Category	Designated Use	Impairment Cause	Impairment Source
MA73-02	**Neponset River**	**5**	Secondary Contact Recreation	Trash	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-29	**Pine Tree Brook**	**5**	Aesthetic	Turbidity	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Fish, other Aquatic Life and Wildlife	Dissolved Oxygen	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Fish, other Aquatic Life and Wildlife	Physical substrate habitat alterations	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Primary Contact Recreation	Aquatic Plants (Macrophytes)	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Primary Contact Recreation	Escherichia coli (E. coli)	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Primary Contact Recreation	Fecal Coliform	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Primary Contact Recreation	Turbidity	Source Unknown
MA73-02	**Neponset River**	**5**	Secondary Contact Recreation	Scum/Foam	Source Unknown
MA73-02	**Neponset River**	**5**	Secondary Contact Recreation	Oil and Grease	Source Unknown
MA73-02	**Neponset River**	**5**	Secondary Contact Recreation	Flocculant Masses	Source Unknown
MA73-02	**Neponset River**	**5**	Secondary Contact Recreation	Debris	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-02	**Neponset River**	**5**	Primary Contact Recreation	Turbidity	Source Unknown
MA73-02	**Neponset River**	**5**	Primary Contact Recreation	Trash	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-02	**Neponset River**	**5**	Primary Contact Recreation	Scum/Foam	Source Unknown
MA73-02	**Neponset River**	**5**	Primary Contact Recreation	Oil and Grease	Source Unknown
MA73-02	**Neponset River**	**5**	Primary Contact Recreation	Flocculant Masses	Source Unknown
MA73-02	**Neponset River**	**5**	Primary Contact Recreation	Fecal Coliform	Source Unknown
MA73-02	**Neponset River**	**5**	Primary Contact Recreation	Escherichia coli (E. coli)	Source Unknown
MA73-02	**Neponset River**	**5**	Primary Contact Recreation	Debris	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-02	**Neponset River**	**5**	Fish, other Aquatic Life and Wildlife	Metals	Source Unknown
MA73-02	**Neponset River**	**5**	Fish, other Aquatic Life and Wildlife	Dissolved Oxygen	Source Unknown

Assessment Unit ID	Waterbody	Integrated List Category	Designated Use	Impairment Cause	Impairment Source
MA73-02	**Neponset River**	**5**	Fish Consumption	PCBs In Fish Tissue	Source Unknown
MA73-02	**Neponset River**	**5**	Fish Consumption	DDT in Fish Tissue	Source Unknown
MA73-02	**Neponset River**	**5**	Aesthetic	Turbidity	Source Unknown
MA73-02	**Neponset River**	**5**	Aesthetic	Trash	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-02	**Neponset River**	**5**	Aesthetic	Scum/Foam	Source Unknown
MA73-02	**Neponset River**	**5**	Aesthetic	Oil and Grease	Source Unknown
MA73-02	**Neponset River**	**5**	Aesthetic	Flocculant Masses	Source Unknown
MA73-02	**Neponset River**	**5**	Aesthetic	Debris	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-02	**Neponset River**	**5**	Secondary Contact Recreation	Turbidity	Source Unknown
MA73-03	**Neponset River**	**5**	Aesthetic	Debris	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-03	**Neponset River**	**5**	Aesthetic	Flocculant Masses	Source Unknown
MA73-03	**Neponset River**	**5**	Aesthetic	Oil and Grease	Source Unknown
MA73-03	**Neponset River**	**5**	Aesthetic	Scum/Foam	Source Unknown
MA73-03	**Neponset River**	**5**	Aesthetic	Trash	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-03	**Neponset River**	**5**	Fish Consumption	DDT in Fish Tissue	Source Unknown
MA73-03	**Neponset River**	**5**	Fish Consumption	PCBs In Fish Tissue	Source Unknown
MA73-03	**Neponset River**	**5**	Fish, other Aquatic Life and Wildlife	Dissolved Oxygen	Source Unknown
MA73-03	**Neponset River**	**5**	Fish, other Aquatic Life and Wildlife	Metals	Source Unknown
MA73-03	**Neponset River**	**5**	Fish, other Aquatic Life and Wildlife	Polychlorinated Biphenyls (PCBs)	Contaminated Sediments
MA73-03	**Neponset River**	**5**	Fish, other Aquatic Life and Wildlife	Polychlorinated Biphenyls (PCBs)	Source Unknown
MA73-03	**Neponset River**	**5**	Primary Contact Recreation	Debris	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-03	**Neponset River**	**5**	Primary Contact Recreation	Enterococcus	Source Unknown
MA73-03	**Neponset River**	**5**	Primary Contact Recreation	Escherichia coli (E. coli)	Discharges from Municipal Separate Storm Sewer Systems (MS4)
MA73-03	**Neponset River**	**5**	Primary Contact Recreation	Escherichia coli (E. coli)	Source Unknown
MA73-03	**Neponset River**	**5**	Primary Contact Recreation	Fecal Coliform	Discharges from Municipal Separate Storm Sewer Systems (MS4)

Assessment Unit ID	Waterbody	Integrated List Category	Designated Use	Impairment Cause	Impairment Source
MA73-03	**Neponset River**	**5**	Primary Contact Recreation	Fecal Coliform	Source Unknown
MA73-03	**Neponset River**	**5**	Primary Contact Recreation	Flocculant Masses	Source Unknown
MA73-03	**Neponset River**	**5**	Primary Contact Recreation	Oil and Grease	Source Unknown
MA73-03	**Neponset River**	**5**	Primary Contact Recreation	Polychlorinated Biphenyls (PCBs)	Contaminated Sediments
MA73-03	**Neponset River**	**5**	Primary Contact Recreation	Polychlorinated Biphenyls (PCBs)	Source Unknown
MA73-03	**Neponset River**	**5**	Primary Contact Recreation	Scum/Foam	Source Unknown
MA73-03	**Neponset River**	**5**	Primary Contact Recreation	Trash	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-03	**Neponset River**	**5**	Secondary Contact Recreation	Debris	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-03	**Neponset River**	**5**	Secondary Contact Recreation	Flocculant Masses	Source Unknown
MA73-03	**Neponset River**	**5**	Secondary Contact Recreation	Oil and Grease	Source Unknown
MA73-03	**Neponset River**	**5**	Secondary Contact Recreation	Scum/Foam	Source Unknown
MA73-03	**Neponset River**	**5**	Secondary Contact Recreation	Trash	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-04	**Neponset River**	**5**	Aesthetic	Debris	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-04	**Neponset River**	**5**	Aesthetic	Trash	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-04	**Neponset River**	**5**	Aesthetic	Turbidity	Combined Sewer Overflows
MA73-04	**Neponset River**	**5**	Aesthetic	Turbidity	Discharges from Municipal Separate Storm Sewer Systems (MS4)
MA73-04	**Neponset River**	**5**	Aesthetic	Turbidity	Municipal Point Source Discharges
MA73-04	**Neponset River**	**5**	Fish Consumption	Cause Unknown [Contaminants in Fish and/or Shellfish]	Source Unknown
MA73-04	**Neponset River**	**5**	Fish Consumption	PCBs In Fish Tissue	Source Unknown
MA73-04	**Neponset River**	**5**	Fish, other Aquatic Life and Wildlife	Dissolved Oxygen	Combined Sewer Overflows
MA73-04	**Neponset River**	**5**	Fish, other Aquatic Life and Wildlife	Dissolved Oxygen	Municipal Point Source Discharges
MA73-04	**Neponset River**	**5**	Fish, other Aquatic Life and Wildlife	Dissolved Oxygen	Unspecified Urban Stormwater
MA73-04	**Neponset River**	**5**	Primary Contact Recreation	Debris	Illegal Dumps or Other Inappropriate Waste Disposal

Assessment Unit ID	Waterbody	Integrated List Category	Designated Use	Impairment Cause	Impairment Source
MA73-04	**Neponset River**	**5**	Primary Contact Recreation	Enterococcus	Source Unknown
MA73-04	**Neponset River**	**5**	Primary Contact Recreation	Enterococcus	Wet Weather Discharges (Point Source and Combination of Stormwater, SSO or CSO)
MA73-04	**Neponset River**	**5**	Primary Contact Recreation	Fecal Coliform	Combined Sewer Overflows
MA73-04	**Neponset River**	**5**	Primary Contact Recreation	Fecal Coliform	Discharges from Municipal Separate Storm Sewer Systems (MS4)
MA73-04	**Neponset River**	**5**	Primary Contact Recreation	Fecal Coliform	Municipal Point Source Discharges
MA73-04	**Neponset River**	**5**	Primary Contact Recreation	Fecal Coliform	Source Unknown
MA73-04	**Neponset River**	**5**	Primary Contact Recreation	Fecal Coliform	Wet Weather Discharges (Point Source and Combination of Stormwater, SSO or CSO)
MA73-04	**Neponset River**	**5**	Primary Contact Recreation	Trash	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-04	**Neponset River**	**5**	Primary Contact Recreation	Turbidity	Combined Sewer Overflows
MA73-04	**Neponset River**	**5**	Primary Contact Recreation	Turbidity	Discharges from Municipal Separate Storm Sewer Systems (MS4)
MA73-04	**Neponset River**	**5**	Primary Contact Recreation	Turbidity	Municipal Point Source Discharges
MA73-04	**Neponset River**	**5**	Secondary Contact Recreation	Debris	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-04	**Neponset River**	**5**	Secondary Contact Recreation	Enterococcus	Source Unknown
MA73-04	**Neponset River**	**5**	Secondary Contact Recreation	Enterococcus	Wet Weather Discharges (Point Source and Combination of Stormwater, SSO or CSO)
MA73-04	**Neponset River**	**5**	Secondary Contact Recreation	Fecal Coliform	Combined Sewer Overflows
MA73-04	**Neponset River**	**5**	Secondary Contact Recreation	Fecal Coliform	Discharges from Municipal Separate Storm Sewer Systems (MS4)
MA73-04	**Neponset River**	**5**	Secondary Contact Recreation	Fecal Coliform	Municipal Point Source Discharges
MA73-04	**Neponset River**	**5**	Secondary Contact Recreation	Fecal Coliform	Source Unknown
MA73-04	**Neponset River**	**5**	Secondary Contact Recreation	Fecal Coliform	Wet Weather Discharges (Point Source and Combination of Stormwater, SSO or CSO)
MA73-04	**Neponset River**	**5**	Secondary Contact Recreation	Trash	Illegal Dumps or Other Inappropriate Waste Disposal
MA73-04	**Neponset River**	**5**	Secondary Contact Recreation	Turbidity	Combined Sewer Overflows

Assessment Unit ID	Waterbody	Integrated List Category	Designated Use	Impairment Cause	Impairment Source
MA73-04	**Neponset River**	**5**	Secondary Contact Recreation	Turbidity	Discharges from Municipal Separate Storm Sewer Systems (MS4)
MA73-04	**Neponset River**	**5**	Secondary Contact Recreation	Turbidity	Municipal Point Source Discharges
MA73-04	**Neponset River**	**5**	Shellfish Harvesting	Fecal Coliform	Combined Sewer Overflows
MA73-04	**Neponset River**	**5**	Shellfish Harvesting	Fecal Coliform	Discharges from Municipal Separate Storm Sewer Systems (MS4)
MA73-04	**Neponset River**	**5**	Shellfish Harvesting	Fecal Coliform	Municipal Point Source Discharges
MA73-04	**Neponset River**	**5**	Shellfish Harvesting	Fecal Coliform	Source Unknown
MA73-04	**Neponset River**	**5**	Shellfish Harvesting	Fecal Coliform	Wet Weather Discharges (Point Source and Combination of Stormwater, SSO or CSO)
MA73059	**Turners Pond**	**5**	Aesthetic	Turbidity	Source Unknown
MA73059	**Turners Pond**	**5**	Fish, other Aquatic Life and Wildlife	Dissolved Oxygen	Source Unknown
MA73059	**Turners Pond**	**5**	Fish, other Aquatic Life and Wildlife	Nutrient/Eutrophication Biological Indicators	Source Unknown
MA73059	**Turners Pond**	**5**	Primary Contact Recreation	Turbidity	Source Unknown
MA73059	**Turners Pond**	**5**	Secondary Contact Recreation	Turbidity	Source Unknown
MA73-26	**Unquity Brook**	**5**	Fish, other Aquatic Life and Wildlife	Dewatering	Channelization
MA73-26	**Unquity Brook**	**5**	Fish, other Aquatic Life and Wildlife	Dewatering	Source Unknown
MA73-26	**Unquity Brook**	**5**	Fish, other Aquatic Life and Wildlife	Dissolved Oxygen	Source Unknown
MA73-26	**Unquity Brook**	**5**	Fish, other Aquatic Life and Wildlife	pH, Low	Source Unknown
MA73-26	**Unquity Brook**	**5**	Fish, other Aquatic Life and Wildlife	Phosphorus, Total	Source Unknown
MA73-26	**Unquity Brook**	**5**	Fish, other Aquatic Life and Wildlife	Physical substrate habitat alterations	Channelization
MA73-26	**Unquity Brook**	**5**	Fish, other Aquatic Life and Wildlife	Physical substrate habitat alterations	Source Unknown
MA73-26	**Unquity Brook**	**5**	Fish, other Aquatic Life and Wildlife	Sedimentation/Siltation	Discharges from Municipal Separate Storm Sewer Systems (MS4)
MA73-26	**Unquity Brook**	**5**	Primary Contact Recreation	Escherichia coli (E. coli)	Discharges from Municipal Separate Storm Sewer Systems (MS4)
MA73-26	**Unquity Brook**	**5**	Primary Contact Recreation	Escherichia coli (E. coli)	Source Unknown
MA73-26	**Unquity Brook**	**5**	Primary Contact Recreation	Fecal Coliform	Discharges from Municipal Separate Storm Sewer Systems (MS4)

Assessment Unit ID	Waterbody	Integrated List Category	Designated Use	Impairment Cause	Impairment Source
MA73-26	**Unquity Brook**	**5**	Primary Contact Recreation	Fecal Coliform	Source Unknown
MA73-26	**Unquity Brook**	**5**	Secondary Contact Recreation	Escherichia coli (E. coli)	Discharges from Municipal Separate Storm Sewer Systems (MS4)
MA73-26	**Unquity Brook**	**5**	Secondary Contact Recreation	Escherichia coli (E. coli)	Source Unknown
MA73-26	**Unquity Brook**	**5**	Secondary Contact Recreation	Fecal Coliform	Discharges from Municipal Separate Storm Sewer Systems (MS4)
MA73-26	**Unquity Brook**	**5**	Secondary Contact Recreation	Fecal Coliform	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Aesthetic	Aquatic Plants (Macrophytes)	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Secondary Contact Recreation	Aquatic Plants (Macrophytes)	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Secondary Contact Recreation	Turbidity	Source Unknown
MA73-30	**Gulliver Creek**	**5**	Fish Consumption	Cause Unknown [Contaminants in Fish and/or Shellfish]	Source Unknown
MA73-30	**Gulliver Creek**	**5**	Fish Consumption	PCBs In Fish Tissue	Source Unknown
MA73-30	**Gulliver Creek**	**5**	Primary Contact Recreation	Fecal Coliform	Source Unknown

Table A-18: Water Quality Impairments in the Town of Milton Subwatershed #: Milton 5 (MassDEP 2019)

Assessment Unit ID	Waterbody	Integrated List Category	Designated Use	Impairment Cause	Impairment Source
MA73-29	**Pine Tree Brook**	**5**	Secondary Contact Recreation	Turbidity	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Secondary Contact Recreation	Aquatic Plants (Macrophytes)	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Aesthetic	Aquatic Plants (Macrophytes)	Source Unknown
MA73003	**Russell Pond**	**5**	Aesthetic	Turbidity	Source Unknown
MA73003	**Russell Pond**	**5**	Fish, other Aquatic Life and Wildlife	Non-Native Aquatic Plants	Introduction of Non-native Organisms (Accidental or Intentional)
MA73003	**Russell Pond**	**5**	Primary Contact Recreation	Turbidity	Source Unknown
MA73003	**Russell Pond**	**5**	Secondary Contact Recreation	Turbidity	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Primary Contact Recreation	Turbidity	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Primary Contact Recreation	Fecal Coliform	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Primary Contact Recreation	Escherichia coli (E. coli)	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Primary Contact Recreation	Aquatic Plants (Macrophytes)	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Fish, other Aquatic Life and Wildlife	Physical substrate habitat alterations	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Fish, other Aquatic Life and Wildlife	Dissolved Oxygen	Source Unknown
MA73-29	**Pine Tree Brook**	**5**	Aesthetic	Turbidity	Source Unknown

Water Quality Goals

Water quality goals may be established for a variety of purposes, including the following:

a.) For **water bodies with known impairments**, a Total Maximum Daily Load (TMDL) is established by MassDEP and the United States Environmental Protection Agency (USEPA) as the maximum amount of the target pollutant that the waterbody can receive and still safely meet water quality standards. If the waterbody has a TMDL for total phosphorus (TP) or total nitrogen (TN), or total suspended solids (TSS), that information is provided below and included as a water quality goal.

b.) For **water bodies without a TMDL for total phosphorus** (TP), a default water quality goal for TP is based on target concentrations established in the Quality Criteria for Water (USEPA, 1986) (also known as the “Gold Book”). The Gold Book states that TP should not exceed 50 ug/L in any stream at the point where it enters any lake or reservoir, nor 25 ug/L within a lake or reservoir. For the purposes of developing WBPs, MassDEP has adopted 50 ug/L as the TP target for all streams at their downstream discharge point, regardless of which type of water body the stream discharges to.

c.) Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013) prescribe the minimum water quality criteria required to sustain a waterbody's designated uses. **Table A-19** lists the Class for each Assessment Unit ID within its corresponding subwatershed (subwatershed Milton 1 is not included because there are no significant waterbodies located in this subwatershed). The water quality goal(s) for bacteria are based on the Massachusetts Surface Water Quality Standards.

Table A-19: Surface Water Quality Classification by Assessment Unit

Subwatershed #: Milton 2		
Assessment Unit ID	**Waterbody**	**Class**
MA74015	Hoosicwhisick Pond	B
Subwatershed #: Milton 3		
Assessment Unit ID	**Waterbody**	**Class**
MA73-02	Neponset River	B
Subwatershed #: Milton 4		
Assessment Unit ID	**Waterbody**	**Class**
MA73-02	Neponset River	B
MA73-03	Neponset River	B
MA73-04	Neponset River	SB
MA73059	Turners Pond	B
MA73-26	Unquity Brook	B
MA73-29	Pine Tree Brook	B
MA73-30	Gulliver Creek	SB
Subwatershed #: Milton 5		
Assessment Unit ID	**Waterbody**	**Class**
MA73003	Russell Pond	B
MA73-29	Pine Tree Brook	B

d.) **Other water quality goals set by the community** (e.g., protection of high quality waters, in-lake phosphorus concentration goal to reduce recurrence of cyanobacteria blooms, etc.).

Refer to **Table A-20—A-22** for a list of water quality goals for TP, bacteria (*E. coli*) and DO. Since the impaired waterbodies within the Town of Milton are within subwatersheds Milton 3, Milton 4, and Milton 5, water quality goals are included for waterbodies within these subwatersheds. It is expected that efforts to reduce TP loading will also result in improvements to DO impairment in Neponset River (MA73-02, MA73-03, MA73-04), Pine Tree Brook (MA73-29), Turners Pond (MA73059), and Unquity Brook (MA73-26). Excess TP can cause eutrophication which depletes dissolved oxygen. Effective management of TP can limit eutrophication and allow DO to naturally replenish (USEPA, 2015).

Table A-20: Water Quality Goals for Subwatershed Milton 3 within the Town of Milton

Pollutant	Waterbody Name (Assessment Unit ID(s))	Goal	Source
Total Phosphorus (TP)	Neponset River (MA73-02)	Total phosphorus should not exceed: --50 ug/L in any stream	Quality Criteria for Water (USEPA, 1986)
Bacteria		**Class B Standards** • Public Bathing Beaches: For *E. coli*, geometric mean of 5 most recent samples shall not exceed 126 colonies/ 100 ml and no single sample during the bathing season shall exceed 235 colonies/100 ml. For enterococci, geometric mean of 5 most recent samples shall not exceed 33 colonies/100 ml and no single sample during bathing season shall exceed 61 colonies/100 ml; • Other Waters and Non-bathing Season at Bathing Beaches: For *E. coli*, geometric mean of samples from most recent 6 months shall not exceed 126 colonies/100 ml (typically based on min. 5 samples) and no single sample shall exceed 235 colonies/100 ml. For enterococci, geometric mean of samples from most recent 6 months shall not exceed 33 colonies/100 ml, and no single sample shall exceed 61 colonies/100 ml.	Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013)
Dissolved Oxygen (DO)		Dissolved oxygen saturation should not be less than 5 mg/L in warm water fisheries or less than 6 mg/L in cold water fisheries.	Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013)

Table A-21: Water Quality Goals for Subwatershed Milton 4 within the Town of Milton[1]

Pollutant	Waterbody Name (Assessment Unit ID(s))	Goal	Source
Total Phosphorus (TP)	Neponset River (MA73-02), Neponset River (MA73-03), Turners Pond (MA73059), Unquity Brook (MA73-26), Pine Tree Brook (MA73-29), Neponset River (MA73-04), Gulliver Creek (MA73-30)	Total phosphorus should not exceed: --50 ug/L in any stream --25 ug/L within any lake or reservoir	Quality Criteria for Water (USEPA, 1986)
Bacteria	Neponset River (MA73-02), Neponset River (MA73-03), Turners Pond (MA73059), Unquity Brook (MA73-26), Pine Tree Brook (MA73-29)	**Class B Standards** • Public Bathing Beaches: For *E. coli*, geometric mean of 5 most recent samples shall not exceed 126 colonies/ 100 ml and no single sample during the bathing season shall exceed 235 colonies/100 ml. For enterococci, geometric mean of 5 most recent samples shall not exceed 33 colonies/100 ml and no single sample during bathing season shall exceed 61 colonies/100 ml; • Other Waters and Non-bathing Season at Bathing Beaches: For *E. coli*, geometric mean of samples from most recent 6 months shall not exceed 126 colonies/100 ml (typically based on min. 5 samples) and no single sample shall exceed 235 colonies/100 ml. For enterococci, geometric mean of samples from most recent 6 months shall not exceed 33 colonies/100 ml, and no single sample shall exceed 61 colonies/100 ml.	Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013)
Bacteria	Neponset River (MA73-04), Gulliver Creek (MA73-30)	**Class SB Standards** • Waters Designated for Shellfishing: Fecal coliform shall not exceed median or geometric mean MPN of 88 organisms/100 ml, nor shall more than 10% of samples exceed an MPN of 260/100 ml (or other values of equivalent protection used by MA Division of Marine Fisheries). • Public Bathing Beaches: No single enterococci sample during the bathing season shall exceed 104 colonies/100 ml, and the geometric mean of 5 most recent samples during same bathing season shall not exceed geometric mean of 35 colonies/100 ml. • Other Waters and Non-bathing Season at Bathing Beaches: No single enterococci sample shall exceed 104 colonies/100 ml and the geometric mean of all samples from most recent 6 months (typically based on a min. of 5 samples) shall not exceed 35 colonies/100 ml.	Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013)
Dissolved Oxygen (DO)	Neponset River (MA73-02), Neponset River (MA73-03), Neponset River (MA73-04), Pine Tree Brook (MA73-29), Turners Pond (MA73059), Unquity Brook (MA73-26)	Dissolved oxygen saturation should not be less than 5 mg/L in warm water fisheries or less than 6 mg/L in cold water fisheries.	Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013)

Note:

1. *There is more than one water quality goal for bacteria due to different Massachusetts Surface Water Quality Standards Classes for different Assessment Units within the subwatershed.*

Table A-22: Water Quality Goals for Subwatershed Milton 5 within the Town of Milton

Pollutant	Waterbody Name (Assessment Unit ID(s))	Goal	Source
Total Phosphorus (TP)	Russell Pond (MA73003), Pine Tree Brook (MA73-29)	Total phosphorus should not exceed: --50 ug/L in any stream --25 ug/L within any lake or reservoir	Quality Criteria for Water (USEPA, 1986)
Bacteria		**Class B Standards** • Public Bathing Beaches: For *E. coli*, geometric mean of 5 most recent samples shall not exceed 126 colonies/ 100 ml and no single sample during the bathing season shall exceed 235 colonies/100 ml. For enterococci, geometric mean of 5 most recent samples shall not exceed 33 colonies/100 ml and no single sample during bathing season shall exceed 61 colonies/100 ml; • Other Waters and Non-bathing Season at Bathing Beaches: For *E. coli*, geometric mean of samples from most recent 6 months shall not exceed 126 colonies/100 ml (typically based on min. 5 samples) and no single sample shall exceed 235 colonies/100 ml. For enterococci, geometric mean of samples from most recent 6 months shall not exceed 33 colonies/100 ml, and no single sample shall exceed 61 colonies/100 ml.	Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013)
Dissolved Oxygen (DO)	Pine Tree Brook (MA73-09)	Dissolved oxygen saturation should not be less than 5 mg/L in warm water fisheries or less than 6 mg/L in cold water fisheries.	Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013)

Land Use and Impervious Cover Information

Land use information and impervious cover is presented in the tables and figures below. Land use source data is from 2005 and was obtained from MassGIS (2009b).

Watershed Land Uses

Table A-23 lists the land uses in the Town of Milton by subwatershed and also includes the land use area totals for the entire town. In general, the Town of Milton is mostly forested (approximately 47 percent); approximately 38 percent of the town is residential; approximately 4 percent of the town is agricultural; approximately 4 percent of the town is commercial; approximately 3 percent is open land; approximately 3 percent is water; approximately 1 percent is designated as highway; and less than 1 percent is classified as industrial. The forested land is mostly concentrated in the southern half of the Town of Milton (subwatersheds Milton 2, Milton 3, and Milton 5) and the residential areas are mostly concentrated in the northern half of the town as illustrated by **Figure A-6**.

Table A-23: Town of Milton Land Uses by Subwatershed

Land Use	Subwatershed #: Milton 1		Subwatershed #: Milton 2		Subwatershed #: Milton 3		Subwatershed #: Milton 4		Subwatershed #: Milton 5		Entire Town of Milton	
	Area (acres)	% of Sub-watershed	Area (acres)	% of Sub-watershed	Area (acres)	% of Sub-watershed	Area (acres)	% of Sub-watershed	Area (acres)	% of Sub-watershed	Area (acres)	% of Town
Forest	75.5	23.8	621.3	83.2	387.2	67.5	661.0	21.1	2211.3	60.2	3956.3	46.9
Low Density Residential	44.0	13.9	4.5	0.6	84.0	14.6	483.8	15.5	796.5	21.7	1412.8	16.7
High Density Residential	120.1	37.9	0.0	0.0	37.9	6.6	1020.6	32.6	205.3	5.6	1383.9	16.4
Medium Density Residential	0.0	0.0	20.6	2.8	0.0	0.0	258.2	8.3	112.5	3.1	391.3	4.6
Agriculture	47.6	15.0	9.3	1.2	9.6	1.7	63.0	2.0	208.3	5.7	337.8	4.0
Commercial	8.1	2.6	7.2	1.0	22.0	3.8	227.4	7.3	48.2	1.3	313.0	3.7
Open Land	16.1	5.1	27.3	3.7	27.8	4.8	166.6	5.3	53.1	1.4	290.9	3.4
Water	1.0	0.3	29.1	3.9	5.0	0.9	159.3	5.1	30.0	0.8	224.4	2.7
Highway	4.7	1.5	27.6	3.7	0.0	0.0	60.1	1.9	3.2	0.1	95.6	1.1
Industrial	0.0	0.0	0.0	0.0	0.0	0.0	28.5	0.9	3.2	0.1	31.6	0.4
TOTAL:	317.1	100.1	746.9	100.1	573.5	99.9	3128.5	100.0	3671.6	100.0	8437.5	100.0

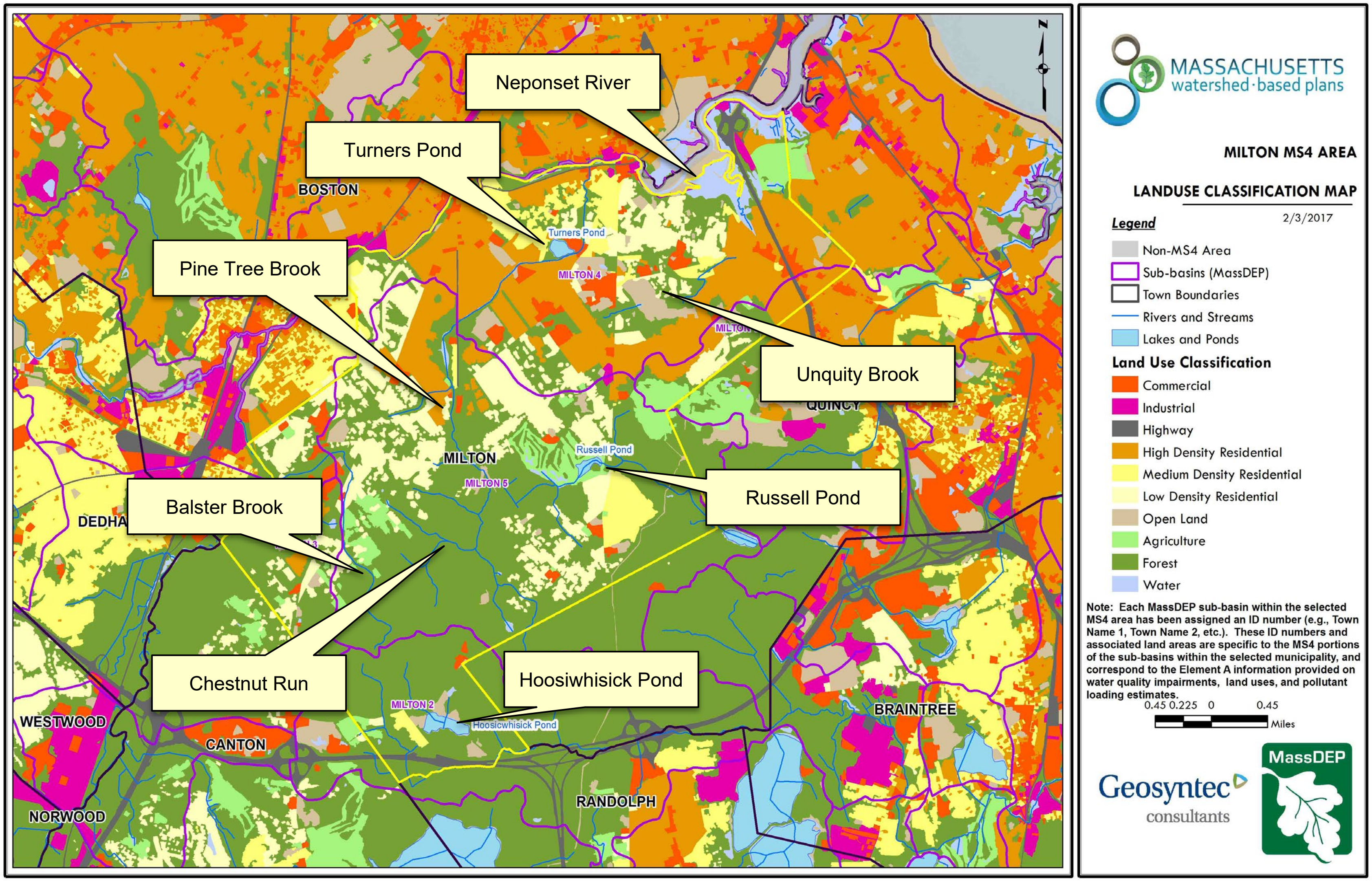


Figure A-6: Town of Milton Land Use Map (MassGIS, 2007; MassGIS, 2009b; MassGIS, 1999; MassGIS, 2001; USGS, 2016).

Watershed Impervious Cover

There is a strong link between impervious land cover and stream water quality. Impervious cover includes land surfaces that prevent the infiltration of water into the ground, such as paved roads and parking lots, roofs, basketball courts, etc. Impervious area within the Town of Milton is more concentrated in the northern portion of the town as illustrated in **Figure A-7** below.

Impervious areas that are directly connected (DCIA) to receiving waters (via storm sewers, gutters, or other impervious drainage pathways) produce higher runoff volumes and transport stormwater pollutants with greater efficiency than disconnected impervious cover areas which are surrounded by vegetated, pervious land. Runoff volumes from disconnected impervious cover areas are reduced as stormwater infiltrates when it flows across adjacent pervious surfaces.

An estimate of DCIA for the five subwatersheds within the Town of Milton was calculated based on the Sutherland equations. USEPA provides guidance (USEPA, 2010) on the use of the Sutherland equations to predict relative levels of connection and disconnection based on the type of stormwater infrastructure within the total impervious area (TIA) of a watershed. Within each subwatershed, the total area of each land use were summed and used to calculate the percent TIA **(Table A-20)**.

Table A-24: TIA and DCIA Values for the Subwatersheds within the Town of Milton

Subwatershed #	Estimated TIA (%)	Estimated DCIA (%)
Milton 1	22.6	17.5
Milton 2	7.7	6.6
Milton 3	12.6	9.9
Milton 4	28.8	22.4
Milton 5	11.5	7.2

The relationship between TIA and water quality can generally be categorized as shown in **Table A-25** (Schueler et al., 2009). The TIA value for the subwatersheds ranged from 7.7 percent to 28.8 percent; therefore, water quality in all of the subwatersheds except Milton 2 can be expected to show clear signs of degradation. The highest TIA value is in the Milton 4 subwatershed and is indicative of fair to poor water quality.

Table A-25: Relationship between Total Impervious Area (TIA) and water quality (Schueler et al., 2009)

% Watershed Impervious Cover	Stream Water Quality
0-10%	Typically high quality, and typified by stable channels, excellent habitat structure, good to excellent water quality, and diverse communities of both fish and aquatic insects.
11-25%	These streams show clear signs of degradation. Elevated storm flows begin to alter stream geometry, with evident erosion and channel widening. Streams banks become unstable, and physical stream habitat is degraded. Stream water quality shifts into the fair/good category during both storms and dry weather periods. Stream biodiversity declines to fair levels, with most sensitive fish and aquatic insects disappearing from the stream.
26-60%	These streams typically no longer support a diverse stream community. The stream channel becomes highly unstable, and many stream reaches experience severe widening, downcutting, and streambank erosion. Pool and riffle structure needed to sustain fish is diminished or eliminated and the substrate can no longer provide habitat for aquatic insects, or spawning areas for fish. Biological quality is typically poor, dominated by pollution tolerant insects and fish. Water quality is consistently rated as fair to poor, and water recreation is often no longer possible due to the presence of high bacteria levels.
>60%	These streams are typical of "urban drainage", with most ecological functions greatly impaired or absent, and the stream channel primarily functioning as a conveyance for stormwater flows.

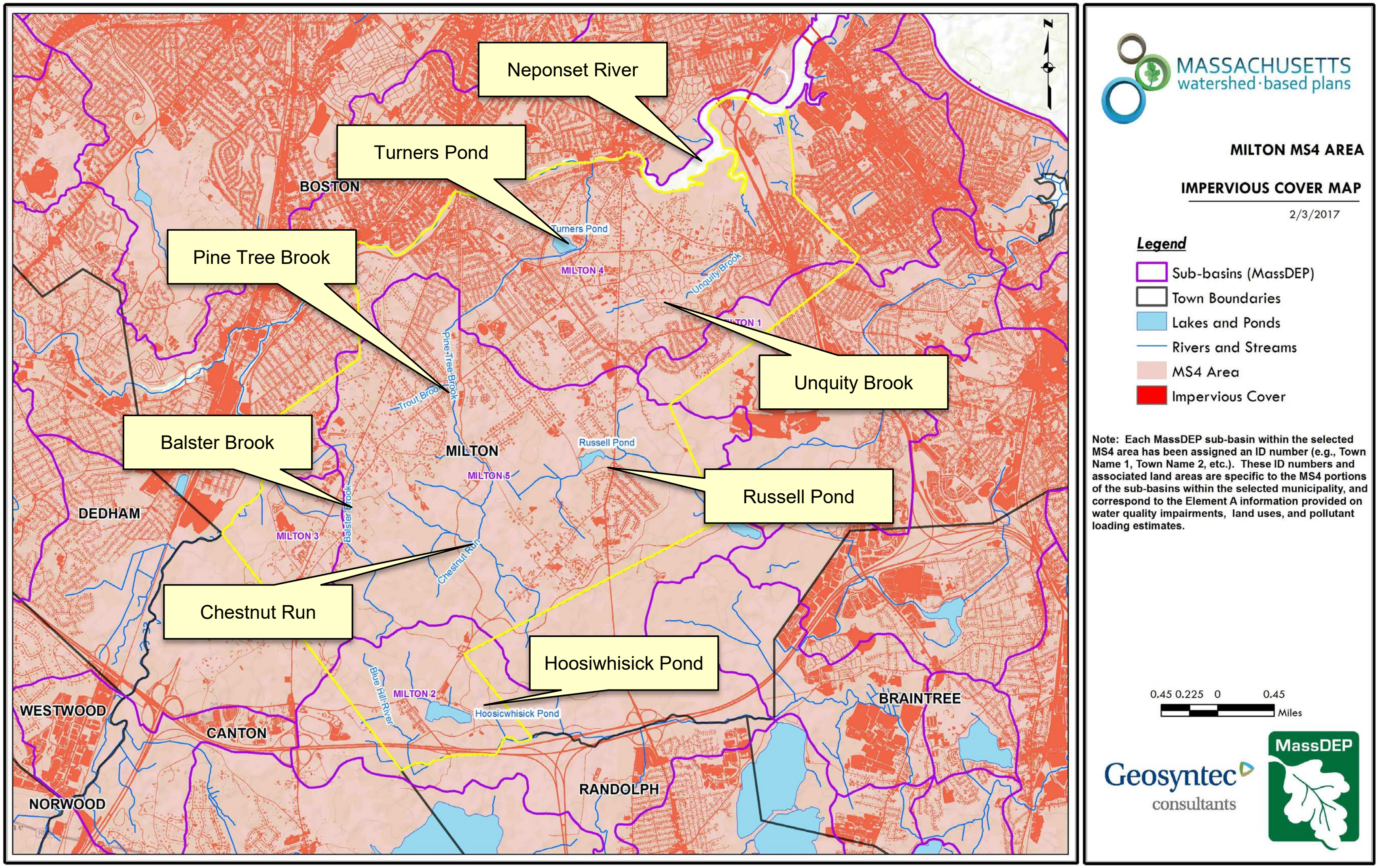


Figure A-7: Town of Milton Impervious Surface Map (MassGIS, 2007; MassGIS 2009a; MassGIS, 1999; MassGIS, 2001; USGS, 2016)

Pollutant Loading

A Geographic Information System (GIS) was used for the pollutant loading analysis. The land use data (MassGIS, 2009b) was intersected with impervious cover data (MassGIS, 2009a) and United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soils data (USDA NRCS and MassGIS, 2012) to create a combined land use/land cover grid. The grid was used to sum the total area of each unique land use/land cover type.

The amount of DCIA was estimated using the Sutherland equations as described above and any reduction in impervious area due to disconnection (i.e., the area difference between TIA and DCIA) was assigned to the pervious D soil category for that land use to simulate that some infiltration will likely occur after runoff from disconnected impervious surfaces passes over pervious surfaces.

Pollutant loading for key nonpoint source pollutants in the MS4 area was estimated by multiplying each land use/cover type area by its pollutant load export rate (PLER) as follows:

$$L_n = A_n * P_n$$

Where L_n = Loading of land use/cover type n (lb/yr); A_n = area of land use/cover type n (acres);
P_n = pollutant load export rate of land use/cover type n (lb/acre/yr)

The PLERs are an estimate of the annual total pollutant load exported via stormwater from a given unit area of a particular land cover type. The PLER values for TN, TP and TSS were obtained from USEPA (USEPA, 2020; UNHSC, 2018; Tetra Tech, 2015) (see values provided in **Appendix C**).

Table A-26 presents the estimated land-use based TN, TP and TSS pollutant loading in the subwatersheds. The largest contributor of land-used-based TP, TN, and TSS load is high-density residential for subwatersheds Milton 1 and Milton 4 and forest for subwatersheds Milton 2, Milton 3, and Milton 5. However, TP and TN generated from forested areas is generally a result of natural processes such as decomposition of leaf litter and other organic material; therefore, the forested portions of the watershed are unlikely to provide opportunities for nutrient load reductions through BMPs. Highway land use is the second largest contributor for subwatershed Milton 2; high- and low-density residential land use is the second largest contributor for subwatershed Milton 3 and Milton 5. Highways and roads can provide opportunities for pollutant load reductions by implementing structural BMPs and/or BMP retrofits along roadways typically within the public right-of-way. Residential areas provide opportunities for pollutant load reductions through public education and outreach and implementation of residential BMPs.

Table A-26: Estimated Pollutant Loading for Key Nonpoint Source Pollutants

Subwatershed #: Milton 1			
Land Use Type	Pollutant Loading[1]		
	Total Phosphorus (TP) (lbs/yr)	Total Nitrogen (TN) (lbs/yr)	Total Suspended Solids (TSS) (tons/yr)
High Density Residential	103	695	10.30
Agriculture	22	132	1.83
Low Density Residential	13	130	1.81
Forest	11	58	2.20
Commercial	10	85	1.06
Highway	6	49	3.46
Open Land	4	34	0.69
Industrial	0	0	0.00
Medium Density Residential	0	0	0.00
TOTAL	170	1,181	21.36

Subwatershed #: Milton 2			
Land Use Type	Pollutant Loading[1]		
	Total Phosphorus (TP) (lbs/yr)	Total Nitrogen (TN) (lbs/yr)	Total Suspended Solids (TSS) (tons/yr)
Forest	96	520	22.13
Highway	25	205	11.96
Open Land	15	126	2.93
Medium Density Residential	11	82	1.21
Commercial	8	65	0.81
Agriculture	5	29	0.30
Low Density Residential	1	12	0.16
High Density Residential	0	0	0.00
Industrial	0	0	0.00
TOTAL	161	1,040	39.51

Subwatershed #: Milton 3			
Land Use Type	Pollutant Loading[1]		
	Total Phosphorus (TP) (lbs/yr)	Total Nitrogen (TN) (lbs/yr)	Total Suspended Solids (TSS) (tons/yr)
Forest	73	424	16.51
High Density Residential	40	257	3.92
Low Density Residential	18	173	2.41
Commercial	17	147	1.85
Open Land	13	114	2.49
Agriculture	5	28	0.25
Highway	0	0	0.00
Industrial	0	0	0.00
Medium Density Residential	0	0	0.00
TOTAL	166	1,144	27.43

Subwatershed #: Milton 4			
Land Use Type	Pollutant Loading[1]		
	Total Phosphorus (TP) (lbs/yr)	Total Nitrogen (TN) (lbs/yr)	Total Suspended Solids (TSS) (tons/yr)
High Density Residential	1,020	6,692	100.49
Commercial	228	1,963	24.57
Low Density Residential	137	1,403	18.86
Forest	134	795	29.42
Medium Density Residential	112	938	13.24
Open Land	78	657	14.29
Highway	50	406	25.01
Industrial	35	298	3.73
Agriculture	33	199	2.94
TOTAL	1,825	13,352	232.55

Subwatershed #: Milton 5			
Land Use Type	Pollutant Loading[1]		
	Total Phosphorus (TP) (lbs/yr)	Total Nitrogen (TN) (lbs/yr)	Total Suspended Solids (TSS) (tons/yr)
Forest	345	1,868	81.82
Low Density Residential	264	2,652	36.22
High Density Residential	154	1,034	15.37
Agriculture	102	610	7.29
Medium Density Residential	68	585	8.08
Commercial	48	411	5.15
Open Land	35	285	6.77
Industrial	5	43	0.53
Highway	3	21	1.34
TOTAL	1,023	7,509	162.58

[1]These estimates do not consider loads from point sources or septic systems.

Element B: Determine Pollutant Load Reductions Needed to Achieve Water Quality Goals

Element B of your WBP should:

Determine the pollutant load reductions needed to achieve the water quality goals established in Element A. The water quality goals should incorporate Total Maximum Daily Load (TMDL) goals, when applicable. For impaired water bodies, a TMDL establishes pollutant loading limits as needed to attain water quality standards.

Estimated Pollutant Loads

Estimated pollutant loads for TP, TN, and TSS were previously presented in **Table A-26** of this WBP. *E. coli* loading has not been estimated for this WBP because there are no known PLERs for *E. coli*.

Water Quality Goals

There are many methodologies that can be used to set pollutant load reduction goals for a WBP. Goals can be based on water quality criteria, surface water standards, existing monitoring data, existing TMDL criteria, or other data. As indicated in Element A, water quality goals are focused on subwatersheds Milton 3, Milton 4, and Milton 5 since these subwatersheds include all of the listed impaired (on the 303(d) list) waterbodies. These subwatersheds are also within the Neponset River basin. As discussed by Element A, water quality goals for this WBP are focused on addressing the Neponset River Watershed Bacteria TMDL, the listed *E. coli,* TP, and DO impairment, and observed elevated concentrations of TP from ambient monitoring data. A description of criteria for each water quality goal is described by **Table B-1—B-3**. Since it is not practical to estimate *E. coli* and DO in terms of loading, the pollutant load reductions needed to achieve water quality goals are focused on TP. It is expected that efforts to reduce TP loading will also result in improvements to *E. Coli* and DO in waterbodies in Milton. Excess TP can cause eutrophication which depletes dissolved oxygen. Effective management of TP can limit eutrophication and allow DO to naturally replenish (USEPA, 2015).

The following adaptive sequence is recommended to establish and track water quality goals:

1. Establish an **interim goal** to reduce land use-based TP by 10 percent of the existing land-use based loading in subwatersheds Milton 3, Milton 4, and Milton 5 (i.e., 17 lbs/yr, 180 lbs/yr, and 102 lbs/yr, respectively) over the next 5 years (by 2027).
2. Establish an **interim goal** to reduce *E. Coli* concentrations within the waterbodies of subwatersheds Milton 3, Milton 4, and Milton 5 to be equal to or less than the Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013).
3. Continue to maintain and expand, as feasible, NepRWA's Citizen Monitoring Network (CWMN) in accordance with recommendations from Elements H&I. Use monitoring results to perform trend analysis

to identify if proposed Element C management measures are resulting in improvements and to identify site candidates to be sampled as indicator sites.

4. Revisit interim water quality goals and make adjustments based on trend analysis
5. Establish **long-term goals** to meet all applicable water quality standards, leading to the delisting of all assessment units within the study area subwatersheds from the 303(d) list within the next 20 years.

Table B-1: Pollutant Load Reductions Needed for Milton 3 Subwatershed

Pollutant	Watershed Assessment Unit ID	Existing Estimated Total Load	Water Quality Goal	Required Load Reduction
Total Phosphorus[1]	Neponset River (MA73-02)	166 lbs/yr	Total phosphorus should not exceed: --50 ug/L in any stream --25 ug/L within any pond, lake, or reservoir	17 lbs/yr (interim)
Bacteria[2]	Neponset River (MA73-02)	*MSWQS for bacteria are concentration standards (e.g., colonies of fecal coliform bacteria per 100 ml), which are difficult to predict based on estimated annual loading.*	Class B. **Class B Standards** • Public Bathing Beaches: For *E. coli*, geometric mean of 5 most recent samples shall not exceed 126 colonies/ 100 ml and no single sample during the bathing season shall exceed 235 colonies/100 ml. For enterococci, geometric mean of 5 most recent samples shall not exceed 33 colonies/100 ml and no single sample during bathing season shall exceed 61 colonies/100 ml; • Other Waters and Non-bathing Season at Bathing Beaches: For *E. coli*, geometric mean of samples from most recent 6 months shall not exceed 126 colonies/100 ml (typically based on min. 5 samples) and no single sample shall exceed 235 colonies/100 ml. For enterococci, geometric mean of samples from most recent 6 months shall not exceed 33 colonies/100 ml, and no single sample shall exceed 61 colonies/100 ml.	*N/A - Concentration Based (goal is to reduce geometric mean to 126 colonies/100 ml or less)*
Dissolved Oxygen[3]	Neponset River (MA73-02)		Dissolved oxygen saturation should not be less than 5 mg/L in warm water fisheries or less than 6 mg/L in cold water fisheries.	*N/A – Concentration Based*

Notes:

1. *A default target TP concentrations is provided which is based on guidance provided by the USEPA in Quality Criteria for Water (1986), also known as the "Gold Book". An initial goal of 50 µg/L for all waterbodies within the watershed will be established. If this goal is achieved, a goal of 25 µg/L for ponds within the watershed will be considered per EPA Gold Book Criteria.*
2. *For all waterbodies, including impaired waters that have a bacteria TMDL, the water quality goal for bacteria is based on the Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013) that apply to the Water Class of the selected water body. See **Appendix B** for additional information from the Neponset River Watershed Bacteria TMDL.*
3. *Dissolved oxygen criteria are based on the Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013).*

Table B-2: Pollutant Load Reductions Needed for Milton 4 Subwatershed

Pollutant	Watershed Assessment Unit ID	Existing Estimated Total Load	Water Quality Goal	Required Load Reduction
Total Phosphorus[1]	Neponset River (MA73-02), Neponset River (MA73-03), Turners Pond (MA73059), Unquity Brook (MA73-26), Pine Tree Brook (MA73-29), Neponset River (MA73-04), Gulliver Creek (MA73-30)	1825 lbs/yr	Total phosphorus should not exceed: --50 ug/L in any stream --25 ug/L within any pond, lake, or reservoir	180 lbs/yr (interim)
	Neponset River (MA73-02), Neponset River (MA73-03), Turners Pond (MA73059), Unquity Brook (MA73-26), Pine Tree Brook (MA73-29)	*MSWQS for bacteria are concentration standards (e.g., colonies of fecal coliform bacteria per 100 ml), which are difficult to predict based on estimated annual loading.*	Class B. **Class B Standards** • Public Bathing Beaches: For *E. coli*, geometric mean of 5 most recent samples shall not exceed 126 colonies/ 100 ml and no single sample during the bathing season shall exceed 235 colonies/100 ml. For enterococci, geometric mean of 5 most recent samples shall not exceed 33 colonies/100 ml and no single sample during bathing season shall exceed 61 colonies/100 ml; • Other Waters and Non-bathing Season at Bathing Beaches: For *E. coli*, geometric mean of samples from most recent 6 months shall not exceed 126 colonies/100 ml (typically based on min. 5 samples) and no single sample shall exceed 235 colonies/100 ml. For enterococci, geometric mean of samples from most recent 6 months shall not exceed 33 colonies/100 ml, and no single sample shall exceed 61 colonies/100 ml.	*N/A - Concentration Based (goal is to reduce geometric mean to 126 colonies/100 ml or less*
Bacteria[2]	Neponset River (MA73-04), Gulliver Creek (MA73-30)	*MSWQS for bacteria are concentration standards (e.g., colonies of fecal coliform bacteria per 100 ml), which are difficult to predict based on estimated annual loading.*	Class SB. **Class SB Standards** • Waters Designated for Shellfishing: Fecal coliform shall not exceed median or geometric mean MPN of 88 organisms/100 ml, nor shall more than 10% of samples exceed an MPN of 260/100 ml (or other values of equivalent protection used by MA Division of Marine Fisheries). • Public Bathing Beaches: No single enterococci sample during the bathing season shall exceed 104 colonies/100 ml, and the geometric mean of 5 most recent samples during same bathing season shall not exceed geometric mean of 35 colonies/100 ml. • Other Waters and Non-bathing Season at Bathing Beaches: No single enterococci sample shall exceed 104 colonies/100 ml and the geometric mean of all samples from most recent 6 months (typically based on a min. of 5 samples) shall not exceed 35 colonies/100 ml.	*N/A – Concentration Based*

Pollutant	Watershed Assessment Unit ID	Existing Estimated Total Load	Water Quality Goal	Required Load Reduction
Dissolved Oxygen[3]	Neponset River (MA73-02), Neponset River (MA73-03), Neponset River (MA73-04), Pine Tree Brook (MA73-29), Turners Pond (MA73059), Unquity Brook (MA73-26)		Dissolved oxygen saturation should not be less than 5 mg/L in warm water fisheries or less than 6 mg/L in cold water fisheries.	*N/A – Concentration Based*

Notes:

1. *A default target TP concentrations is provided which is based on guidance provided by the USEPA in Quality Criteria for Water (1986), also known as the "Gold Book". An initial goal of 50 µg/L for all waterbodies within the watershed will be established. If this goal is achieved, a goal of 25 µg/L for ponds within the watershed will be considered per EPA Gold Book Criteria.*
2. *For all waterbodies, including impaired waters that have a bacteria TMDL, the water quality goal for bacteria is based on the Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013) that apply to the Water Class of the selected water body. See* ***Appendix B*** *for additional information from the Neponset River Watershed Bacteria TMDL. There is more than one water quality goal for bacteria due to different Massachusetts Surface Water Quality Standards Classes for different Assessment Units within the subwatershed.*
3. *Dissolved oxygen criteria are based on the Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013).*

Table B-3: Pollutant Load Reductions Needed for Milton 5 Subwatershed

Pollutant	Watershed Assessment Unit ID	Existing Estimated Total Load	Water Quality Goal	Required Load Reduction
Total Phosphorus[1]	Russell Pond (MA73003), Pine Tree Brook (MA73-29)	1023 lbs/yr	Total phosphorus should not exceed: --50 ug/L in any stream --25 ug/L within any pond, lake, or reservoir	102 lbs/yr (interim)
Bacteria[2]	Russell Pond (MA73003), Pine Tree Brook (MA73-29)	*MSWQS for bacteria are concentration standards (e.g., colonies of fecal coliform bacteria per 100 ml), which are difficult to predict based on estimated annual loading.*	Class B. **Class B Standards** • Public Bathing Beaches: For *E. coli*, geometric mean of 5 most recent samples shall not exceed 126 colonies/ 100 ml and no single sample during the bathing season shall exceed 235 colonies/100 ml. For enterococci, geometric mean of 5 most recent samples shall not exceed 33 colonies/100 ml and no single sample during bathing season shall exceed 61 colonies/100 ml; • Other Waters and Non-bathing Season at Bathing Beaches: For *E. coli*, geometric mean of samples from most recent 6 months shall not exceed 126 colonies/100 ml (typically based on min. 5 samples) and no single sample shall exceed 235 colonies/100 ml. For enterococci, geometric mean of samples from most recent 6 months shall not exceed 33 colonies/100 ml, and no single sample shall exceed 61 colonies/100 ml.	*N/A - Concentration Based (goal is to reduce geometric mean to 126 colonies/100 ml or less*
Dissolved Oxygen[3]	Pine Tree Brook (MA73-09)		Dissolved oxygen saturation should not be less than 5 mg/L in warm water fisheries or less than 6 mg/L in cold water fisheries.	*N/A – Concentration Based*

Notes:

1. *A default target TP concentrations is provided which is based on guidance provided by the USEPA in Quality Criteria for Water (1986), also known as the "Gold Book". An initial goal of 50 µg/L for all waterbodies within the watershed will be established. If this goal is achieved, a goal of 25 µg/L for ponds within the watershed will be considered per EPA Gold Book Criteria.*
2. *For all waterbodies, including impaired waters that have a bacteria TMDL, the water quality goal for bacteria is based on the Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013) that apply to the Water Class of the selected water body. See **Appendix B** for additional information from the Neponset River Watershed Bacteria TMDL.*
3. *Dissolved oxygen criteria are based on the Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013).*

Element C: Describe management measures that will be implemented to achieve water quality goals

Element C: A description of the nonpoint source management measures needed to achieve the pollutant load reductions presented in Element B, and a description of the critical areas where those measures will be needed to implement this plan.

Recently Constructed Management Measures

Tree filter boxes along Wendell Brook (Milton 4 Subwatershed):

The Town was awarded funding through the Fiscal Year 2017 Section 319 Nonpoint Source Pollution Grant Program to install six tree filter boxes along Wendell Brook, which is a tributary to Pine Tree Brook. Each tree filter box was designed to capture approximately 0.30 acres of drainage area within the roadway, effectively treating the entirety of the impervious surfaces within the Town of Milton's right of way on Wendell Park. Each tree filter box is accompanied by a catch basin, installed directly down stream of each tree filter box to serve as a bypass during large storm events when the tree filter boxes may be over capacity. The tree filter boxes and catch basins were tied into the existing drainage bypass pipes. Granite curbing was also installed for 10 ft on either side of the structures to help channel storm water into them. Loaming and seeding was performed along the length of the roadway to help fortify the shoulders and establish the gutter in order to direct as much stormwater as possible into the new structures while still allowing the stormwater to flow overland into the brook in the event of larger storms. Following the installation of new structures, the remaining fifteen bypass pipes were capped and filled with a concrete slurry for abandonment. The project also included the removal of dead vegetation and felled trees along the brook in order to restore proper uninhibited flow. It was anticipated that these BMPs would result in a combined load reduction of approximately 2,163 lbs/yr of TSS, 4.3 lbs/yr of TP, 8.5 lbs/yr of TN, and 147,400 billion colonies/year of fecal coliform (Town of Milton 2019a)[5].

Rain Garden, Infiltration Basin, and Vegetated Swale at Milton Police Station (Milton 4 Subwatershed):

The Milton Police Station parking lot contains a system of stormwater BMPs that were constructed in 2018—2019. At the front of the parking lot (south side near entrance) there is a 1,040 square-foot rain garden. At the back of the parking lot at the northeast end of the property, there is a 1,310 square-foot infiltration basin. Connecting the two larger structures is a vegetated swale on the southeast edge of the lot (Town of Milton 2020b). The total drainage area of the tworain gardens and the infiltration basin is approximately 1.7 acres and 5.8 acres, respectively. This site was initially selected based on conclusions of the Unquity Brook Assessment Project (NepRWA, 2016); it was identified as a water quality problem area during the monitoring component of the project. The steep bank between the brook and the parking lot was severely eroded and causing obvious sedimentation issues within the brook. In addition to sedimentation large amounts of trash and debris were also being washed off of the parking lot into the stream.

[5] In 2004—2005, tree filter boxes were also installed along Brook Road and Lincoln Street, and bioretention cells were installed along Pine Tree Brook Path (across from the high school).

Ongoing Management Measures

Algerine Corner (Corner of Centre Street and Pleasant Street) (Milton 4 Subwatershed):

The Town of Milton was awarded funding through the Fiscal Year 2021 Section 319 Nonpoint Source Pollution Grant Program to install an infiltration basin on Algerine Corner (corner of Centre Street and Pleasant Street) that will collect and treat runoff before it reaches Unquity Brook. A diversion manhole is proposed at the corner of Pleasant Street and Centre Street to divert stormwater runoff into the infiltration basin's pretreatment structure that will remove sedimentation and trash prior to entering the infiltration basin. It was estimated that the Algerine Corner BMP will result in a load reduction of between 8,871 and 14,962 lbs/yr of TSS, between 33.7 and 56.9 lbs/yr of TP, and between 186.5 and 315.1 lbs/yr of TN (Town of Milton 2021).

Future Management Measures

Unquity Brook Watershed (Milton 4 Subwatershed):

The Unquity Brook Assessment Project (NepRWA 2016) included an evaluation of the Unquity Brook subwatershed to identify opportunities for stormwater BMP retrofit location in order to reduce the negative impact of stormwater runoff within Unquity Brook. A GIS-based desktop analysis was conducted that included consideration of property ownership, stormwater and sanitary sewer infrastructure, catchment area, soil characteristics, and land cover. Once these layers were assembled, the map was analyzed to create a list of 14 locations that could be potentially suitable for BMP retrofits. Field investigations were completed, and a few locations were ruled out based on site conditions, which resulted in a list of 10 potential BMP retrofit locations. A meeting was conducted between the town of Milton and NepRWA to discuss the potential BMP sites. During the meeting all ten sites were prioritized based on feasibility, property owner type, BMP type, soil type, and drainage area. Other factors considered included visibility, educational opportunities, proximity to areas of particularly poor water quality, and potential for abutter conflict. Conceptual designs were completed for the top 4 sites identified by the BMP survey (NepRWA 2016). One of the four conceptual designs was for the Milton Police Station, which was recently constructed (detailed above). Another of the four conceptual designs was for Algerine Corner (identified in the report as "Reservation Road and Centre Street"); this project is ongoing and described above. The remaining two sites are summarized below, and the conceptual designs are included in **Appendix D**.

- **Cunningham Elementary School.** This site was selected because it would provide a great educational opportunity, has a large drainage area, and has soils with good drainage that would allow for infiltration and groundwater recharge. The Town of Milton is currently working on design of this site through a Massachusetts Office of Coastal Zone Management (CZM) grant.
- **Brook Road and Centre Street.** This site was selected because the parcels are highly visible, would treat a large drainage area, and provide an opportunity for public education through signage. There are three possible BMP locations on this property. One of the proposed locations is at an informal war memorial. This site would be a great opportunity to enhance and beautify the war memorial while also performing a stormwater management function. The other sites are a partially wooded lot directly adjacent to this site and a road right-of-way on the opposite corner of the intersection.

Pine Tree Brook Watershed (Milton 4 Subwatershed):

The NepRWA partnered with the Town of Milton to conduct a BMP retrofit feasibility survey within the Town under funding from the Massachusetts DEP's 604(b) Program (EPG, 2013). The project identified sites in the Town of Milton that were suitable for retrofitting with structural stormwater BMPs and where conceptual designs could be developed for BMPs at those sites to restore and maintain primary contact recreation and other designated uses. Fifteen sites were initially evaluated and seven were removed from further consideration after a stakeholder meeting. The remaining eight sites were ranked based on water quality benefits, site characteristics, constructability, maintenance access, and public education. Wendell Park, the Lincoln Street Parking Lot/Kelly Field, and Lafayette Street were initially ranked in the "top 3" sites for further design development/field investigation. This included a more detailed site visit and advancement of a test pit (if applicable to the BMP design) at each of the three locations to verify groundwater table elevation and soil type. Following the advancement of test pits at the Lincoln Street Parking lot/Kelly Field, which showed soils with poor percolation rates, it was removed from further consideration and Sumner Street replaced it in the top three. These top three ranking sites were further investigated and conceptual designs for the top three ranking sites were developed. Wendell Park has been constructed and is described in the section above. The other two sites, on Lafayette Street and Sumner Street Park, are still strong candidates for future BMP design and implementation in the Pine Tree Brook watershed (EPG, 2013). These two sites are described below:

- **Lafayette Street BMP (1st Priority).** The proposed BMP at Lafayette Street includes installing a sediment forebay east of Milton's Lafayette Street cul-de-sac and removing the existing 350-foot drainage pipe to allow the drainage to disperse off the end of the street and create an enhanced wetland treatment system abutting Pine Tree Brook. It was estimated that this BMP would result in a combined load reduction of approximately 2,905 lbs/yr of TSS, 3.6 lbs/yr of TP, 8.2 lbs/yr of TN, and 226,638 billion colonies/year of fecal coliform (EPG, 2013). The Town of Milton has applied for Fiscal Year 2021 Section 319 grant funding to help implement the proposed BMP at Lafayette Street (Town of Milton, 2020c). Lafayette Street was chosen as the first priority for future stormwater BMP implementation because of its relatively low cost, its siting on Town land, its discharge area to a distressed waterbody, the relatively large amount of impervious surface treated, and the technical feasibility to retrofit a Low Impact Development stormwater BMP.
- **Sumner Street Park BMP (2nd Priority).** The proposed BMPs at Sumner Street Park includes a wet swale, bioretention basin with sediment forebay and bioretention filtration systems. It was estimated that these BMPs would result in a combined load reduction of approximately 3,510 lbs/yr of TSS, 5.9 lbs/yr of TP, 10.3 lbs/yr of TN, and 250,675 billion colonies/year of fecal coliform (EPG, 2013).
- **Additional Priority Sites.** The remaining five priority sites are located at Milton Street, Gulliver Street, Lincoln Street Parking Lot/Kelly Field, Meetinghouse Lane, and Elm Street.

Figure C-1 identifies the recently constructed, ongoing and potential future structural BMPs in the Town of Milton, which are described above.

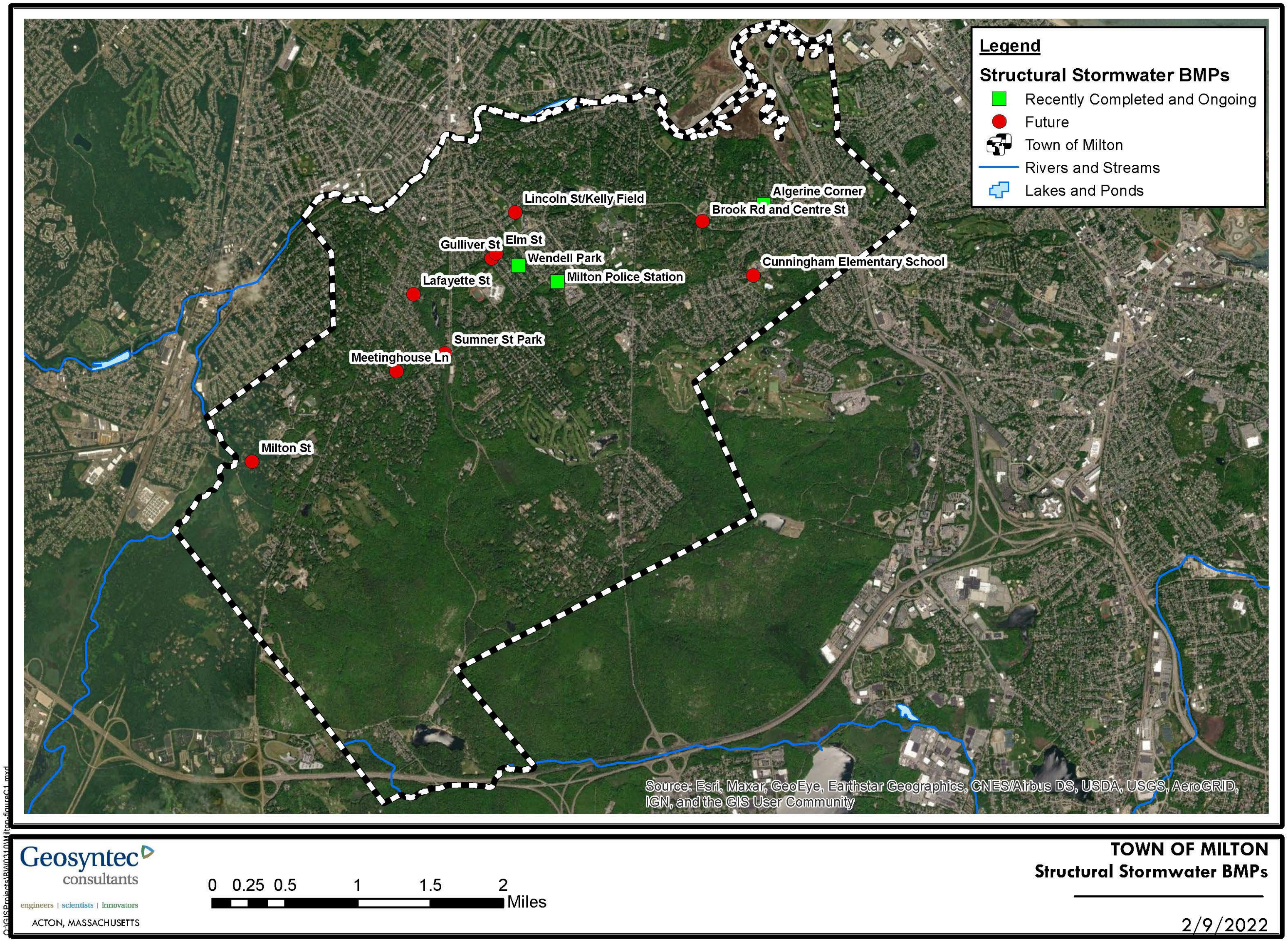


Figure C-1: Recently Constructed, Ongoing, and Future Structural BMP Locations in the Town of Milton

BMP Hotspot Map:

The following GIS-based analysis was performed within the Town of Milton as a planning-level screening to help identify high priority parcels for BMP or stormwater management measure implementation[6]:

- Each parcel within the watershed was evaluated based on ten different criteria accounting for the parcel ownership, social value, and implementation feasibility (See **Table C-1** for more detail below);
- Each criterion was then given a score from 0 to 5 to represent the priority for BMP implementation based on a metric corresponding to the criterion (e.g., a score of 0 would represent lowest priority for BMP implementation whereas a score of 5 would represent highest priority for BMP implementation);
- A multiplier was also assigned to each criterion, which reflected the weighted importance of the criterion (e.g., a criterion with a multiplier of 3 had greater weight on the overall prioritization of the parcel than a criterion with a multiplier of 1); and
- The weighted scores for all the criteria were then summed for each parcel to calculate a total BMP priority score.

Table C-1 presents the criteria, indicator type, metrics, scores, and multipliers that were used for this analysis. Parcels with total scores above 60 are recommended for further investigation for BMP implementation suitability. **Figure C-2** presents the resulting BMP Hotspot Map for the watershed. The following link includes a Microsoft Excel file with information for all parcels that have a score above 60: hotspot spreadsheet.

This analysis solely evaluated individual parcels for BMP implementation suitability and likelihood for the measures to perform effectively within the parcel's features. This analysis does not quantify the pollutant loading to these parcels from the parcel's upstream catchment. When further evaluating a parcel's BMP implementation suitability and cost-effectiveness of BMP implementation, the existing pollutant loading from the parcel's upstream catchment and potential pollutant load reduction from BMP implementation should be evaluated. It would also be worthwhile to analyze how the parcels with high scores align with monitoring locations with high TP concentrations. This analysis may be used for future consideration when identifying additional BMP opportunity locations within the Town of Milton.

[6] GIS data used for the BMP Hotspot Map analysis included MassGIS (2015a); MassGIS (2015b); MassGIS (2017a); MassGIS (2017b); MassGIS (2020);MA Department of Revenue Division of Local Services (2016); MassGIS (2005); ArcGIS (2020); MassGIS (2009b); MassGIS (2012); and ArcGIS (2020b).

Table C-1: Matrix for BMP Hotspot Map GIS-based Analysis

Criteria	Indicator Type	METRICS																											Multiplier	Maximum Potential Score
		Yes or No?		Hydrologic Soil Group				Land Use Type									Water Table Depth				Parcel Area			Parcel Average Slope						
		Yes	No	A or A/D	B or B/D	C or C/D	D	Low and Medium Density Residential	High Density Residential	Commercial	Industrial	Highway	Agriculture	Forest	Open Land	Water	101-200 cm	62-100 cm	31-61 cm	0-30 cm	Greater than 2 acres	Between 1-2 acres	Less than 1 acre	Less than 2%	Between 2% and 15%	Greater than 15%	Less than 50%	Between 51% and 100%		
Is the parcel a school, fire station, police station, town hall or library?	Ownership	5	0																										2	10
Is the parcel's use code in the 900 series (i.e. public property or university)?	Ownership	5	0																										2	10
Is parcel fully or partially in an Environmental Justice Area?	Social	5	0																										2	10
Most favorable Hydrologic Soil Group within Parcel	Implementation Feasibility			5	3	0	0																						2	10
Most favorable Land Use in Parcel	Implementation Feasibility							1	2	4	2	4	5	1	4	X[1]													3	15
Most favorable Water Table Depth (deepest in Parcel)	Implementation Feasibility																5	4	3	0									2	10
Parcel Area	Implementation Feasibility																				5	4	1						3	15
Parcel Average Slope	Implementation Feasibility																							3	5	1			1	5
Percent Impervious Area in Parcel	Implementation Feasibility																										5	2.5	1	5
Within 100 ft buffer of receiving water (stream or lake/pond)?	Implementation Feasibility	5	2																										2	10

Note 1: **X** denotes that parcel is excluded

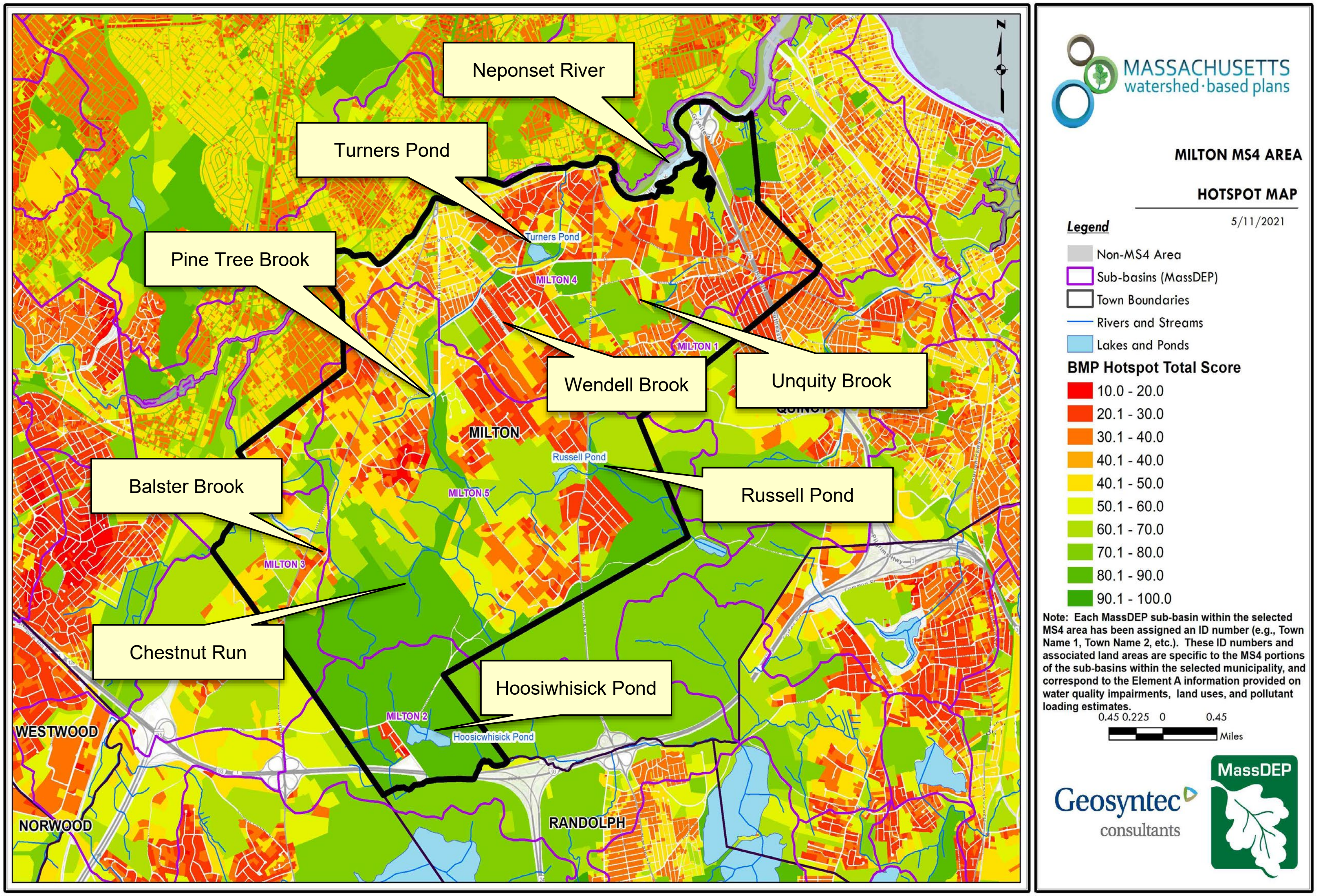


Figure C-2: BMP Hotspot Map (MassGIS (2015a), MassGIS (2015b), MassGIS (2017a), MassGIS (2017b), MassGIS (2020), MA Department of Revenue Division of Local Services (2016), MassGIS (2005), ArcGIS (2020), MassGIS (2009b), MassGIS (2012), ArcGIS (2020b))

Nonstructural BMPs

BMPs can also be non-structural (e.g., street sweeping, catch basin cleaning). The Town of Milton's Catch Basin Cleaning Optimization Plan (Town of Milton 2019b) states that all catch basins are scheduled to be cleaned a minimum of once every three years. Catch basins that are more than 50% full at the time of cleaning are added to a priority list where they are checked for sediment on a yearly basis. In the 2019-2020 MS4 Permit year, 661 catch basins were inspected, 636 were cleaned (out of a total of 3,652 catch basins), and 7,285 cubic feet of material was removed. Additionally, the Town of Milton increased street sweeping frequency of all municipal owned street and parking lot to a minimum of two times per year (spring and fall) in accordance with the MS4 Permit (Town of Milton 2020a). In the 2019-2020 permit year, 1,178 cubic yards of materials were removed during street sweeping. Both street sweeping and catch basin cleaning are required by the Town of Milton's MS4 permit. Other non-structural BMPs required by the permit include Illicit Discharge Detection and Elimination (IDDE) efforts that aim to locate sources of human or other fecal matter in streams.

Element D: Identify Technical and Financial Assistance Needed to Implement Plan

Element D: Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement this plan.

Current and Future Management Measures

The funding and cost estimates needed to implement the existing and ongoing management measures as well as future management measures, which are presented in Element C of this WBP, are included in **Table D-1**. These costs include the engineering design, construction, and permitting. The estimated annual operation and maintenance costs for the Wendell Brook BMPs were estimated, based on input from the Milton Town Engineer, to be approximately $5,000/year. The Milton Town Engineer also estimated that the annual Operation and Maintenance costs for all of the existing BMPs in Milton and the proposed BMP on Lafayette Street is approximately $30,000/year. **Table D-1** also includes the technical assistance needed for each of the management measures.

Table D-1: Summary of Current BMP Costs

Existing and Ongoing Management Measures				
BMP	**Total Cost**	**Portion of Total Cost that is grant-funded**	**Grant**	**Technical Assistance Needed**
Algerine Corner Stormwater BMP (Town of Milton 2021)	$270,014	$158,500	Section 319	Not Applicable (Completed)
Wendell Brook BMPs (Geosyntec 2021)	$200,641	$87,030	Section 319	Not Applicable (Completed)
Milton Police Station BMP	Unknown	Unknown	Unknown	Engineering, Design, and Permitting
Future Management Measures				
BMP	**Total Cost**	**Portion of Total Cost that is grant-funded**	**Grant**	**Technical Assistance Needed**
Lafayette Street BMP (EPG 2013)	$118,059	$70,598	Section 319	Engineering, Design, and Permitting
Sumner Street BMP (EPG 2013)	$227,922	TBD	TBD	Engineering, Design, and Permitting
Milton Street BMP (EPG 2013)	$184,705	TBD	TBD	Engineering, Design, and Permitting
Gulliver Street BMP (EPG 2013)	$147,764	TBD	TBD	Engineering, Design, and Permitting
Lincoln Street Parking Lot/Kelly Field BMP (EPG 2013)	$7,891	TBD	TBD	Engineering, Design, and Permitting
Meetinghouse Lane BMP (EPG 2013)	$385,628	TBD	TBD	Engineering, Design, and Permitting
Elm Street BMP (EPG 2013)	$163,081	TBD	TBD	Engineering, Design, and Permitting
Cunningham Elementary School (NepRWA 2016)	Unknown	Unknown	Coastal Zone Management (CZM)	Engineering, Design, and Permitting
Brook Road and Centre Street (NepRWA 2016)	Not Estimated	TBD	TBD	Engineering, Design, and Permitting
Reservation Road and Centre Street (NepRWA 2016)	Not Estimated	TBD	TBD	Engineering, Design, and Permitting

Funding for future BMP installations to further reduce loads within the Town of Milton may be provided by a variety of sources, such as the Section 319 Nonpoint Source Pollution Grant Program, town capital funds, state grants such as Coastal Pollution Remediation grants, Municipal Vulnerability Preparedness or other grant programs such as hazard mitigation funding. Guidance is available to provide additional information on potential funding sources for nonpoint source pollution reduction efforts[7].

[7] http://prj.geosyntec.com/prjMADEPWBP_Files/Guide/Element%20D%20-%20Funds%20and%20Resources%20Guide.pdf

Element E: Public Information and Education

Element E: Information and Education (I/E) component of the watershed plan used to:

1. Enhance public understanding of the project; and
2. Encourage early and continued public participation in selecting, designing, and implementing the NPS management measures that will be implemented.

The components of the Town of Milton nonpoint source public information and education program are described below. This section of the WBP will be updated when the plan is reevaluated in 2025 in accordance with Elements F&G of this document.

Step 1: Goals and Objectives

The goals and objectives for the watershed public information and education program.

1. Provide information to promote watershed stewardship.
2. Provide information to homeowners within Milton regarding different types of residential BMPs[8] that could be implemented.
3. Provide information about completed and proposed stormwater BMPs and their anticipated water quality benefits.
4. Meet Massachusetts MS4 Permit Requirements.

Step 2: Target Audience

Target audiences that need to be reached to meet the goals and objectives identified above.

1. Town of Milton residents.
2. Businesses within the Town of Milton.
3. Schools within the Town of Milton.
4. Watershed organizations and other user groups, including NepRWA.

Step 3: Outreach Products and Distribution

The outreach product(s) and distribution form(s) that will be used for each.

1. For the Algerine Corner BMP project, the outreach campaign included (Town of Milton 2021):
    a. Algerine Corner Stormwater BMP Design webpage on the Town's website that has been updated throughout the completion of the final project design.

[8] Examples of residential BMPs are provided in the "Massachusetts Clean Water Toolkit" (MassDEP, 2016) at https://megamanual.geosyntec.com/NPSManual_2013/HTML/residential.htm

        i. Includes design information as well as informational supporting documents, educational on water quality, the importance of BMPs and what residents can do to help keep pollution out of the stormwater drainage system.

   b. Initial press release in the town paper.

   c. Mailing to all town residents.

   d. Interpretate signage on site.

2. For the Wendell Brook BMP project, the outreach campaign included:

   a. A press release for distribution by local media.

   b. Sent a town-wide educational mailing to all residents and businesses.

   c. A targeted post card.

   d. Several online blog and newsletter articles.

   e. Social medial posts.

   f. Interpretative signage at the Wendell Brook BMP locations.

3. A similar outreach effort to that of the Wendell Brook BMP project will be completed for future BMP projects in the Town of Milton such as the proposed Cunningham School and Lafayette Street BMPs.
4. The Stormwater Management Program (SWMP) for the town of Milton includes additional outreach efforts being conducted within the Town of Milton (Town of Milton 2019c), including:
   a. Fact sheet to educate dog owners about picking up dog waste.

   b. Maintain "mutt mitt" stations in pet waste problem area with pet-waste related signage.

   c. Inform owners of septic systems about proper maintenance by providing an informational document at the Health Department offices and on the Town website.

   d. Update the stormwater section of the Town's website at least three times per year to provide information on topics such as lawn care, yard waste, automobile maintenance, etc.
   e. Send water or stormwater bill mailers with information about household Best Management Practices.
   f. Develop two press releases per year that describe the importance of stormwater management either through newspaper articles or on Town website.

Step 4: Evaluate Information/Education Program

Outreach products may be evaluated by the following methods:

1. Track the number of watershed events and attendance at each.

2. Track the number of materials and information distributed, such as pamphlets, newsletters, and emails, and the size of the lists receiving these materials.

3. Track the number of people reach by each stormwater message using metrics such as number of subscribers to a given publication and hit counters on web articles.

Elements F & G: Implementation Schedule and Measurable Milestones

Element F: Schedule for implementing the nonpoint source management measures identified in this plan that is reasonably expeditious.

Element G: A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented.

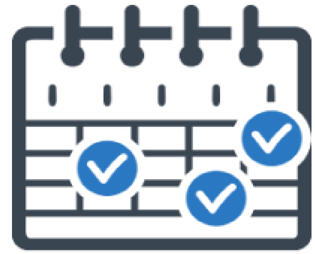


Table FG-1 provides a preliminary schedule for implementing recommendations provided by this WBP. It is expected that the WBP will be reevaluated and updated at least once every three years, or as needed, based on ongoing monitoring results and other ongoing efforts. New projects will be identified through future data analysis and stakeholder engagement and will be included in updates to the implementation schedule.

Table FG-1: Implementation Schedule and Interim Measurable Milestones[9]

Category	Action	Estimated Cost	Year(s)
Monitoring/ Vegetation	Continue to perform annual water quality sampling per Element H&I monitoring guidance and the EPA-approved Quality Assurance Project Plan (QAPP) developed by NepRWA		Annual
Structural BMPs	Implement Algerine Corner BMP.	$270,000	2022
	Obtain funding , design, and implement structural BMP(s) at Lafayette Street	$118,000	2023
	Obtain funding and complete final design and construction of structural BMP at Cunningham School	To be determined	2023
Nonstructural BMPs	Continue to document potential pollutant removals from ongoing nonstructural BMPs (i.e., street sweeping, catch basin cleaning). The methodology is included in the 2016 Massachusetts Small MS4 Permit and in Elements H&I of this WBP.		2023
	Evaluate ongoing nonstructural BMPs and determine if modifications can be made to optimize pollutant removals (e.g., increase frequency).		2023
	Routinely implement optimized nonstructural BMPs.		Annual
Public Education and Outreach *(See Element E)*	Continue NepRWA watershed events and outreach, and continue public education and outreach efforts by the Town of Milton		Periodical
	Continue to distribute educational materials to residents of the Town of Milton, including information on residential BMPs.		Annual

[9] Note that goals and milestones of this WBP are intended to be adaptable and flexible. Stakeholders will perform tasks contingent on available resources and funding.

Category	Action	Estimated Cost	Year(s)
Adaptive Management and Plan Updates	Establish a working group that includes stakeholders and other interested parties to implement recommendations and track progress. Meet at least twice per year.		2022
	Reevaluate WBP at least once every three years and adjust, as needed, based on ongoing efforts (e.g., based on monitoring results, 319 funding, etc.). – Next update, February 2025		2025
	Use monitoring results to reevaluate BMP effectiveness at reducing TP, pathogens, and/or other indicator parameters in the Town of Milton subwatersheds and establish additional long-term reduction goal(s), if needed.		**2025**
	Delist waterbodies in the Town of Milton from the 303(d) list.		**2042**

Elements H & I: Progress Evaluation Criteria and Monitoring

Element H: A set of criteria used to determine (1) if loading reductions are being achieved over time and (2) if progress is being made toward attaining water quality goals. Element H asks "**how will you know if you are making progress towards water quality goals?**" The criteria established to track progress can be direct measurements (e.g., E. coli bacteria concentrations) or indirect indicators of load reduction (e.g., number of beach closings related to bacteria).

Element I: A monitoring component to evaluate the effectiveness of implementation efforts over time, as measured against the Element H criteria. Element I asks "**how, when, and where will you conduct monitoring?**"

The water quality goals are presented under Element A of this plan. To achieve the interim water quality goals, the annual TP loading must be reduced to the amount described in Element B. Element C of this plan describes the various management measures that will be implemented to help make progress towards this targeted load reduction. The evaluation criteria and monitoring program described below will be used to measure the effectiveness of the proposed management measures (described in Element C) in improving the water quality of waterbodies within the Town of Milton.

Indirect Indicators of Load Reduction

Nonstructural BMPs:

Potential load reductions from non-structural BMPs (i.e., street sweeping and catch basin cleaning) can be estimated from indirect indicators, such as the number of miles of streets swept or the number of catch basins cleaned. The Town of Milton currently performs street sweeping and catch basin cleaning, in addition to other non-structural BMPs. Appendix F of the 2016 Massachusetts Small MS4 General Permit provides specific guidance for calculating TP removal from these practices. As indicated by **Element C**, the Town of Milton annually estimates the potential TP removal from these ongoing activities in accordance with the 2016 Massachusetts Small MS4 General Permit. The Town of Milton also has a catch basin cleaning optimization plan (Town of Milton 2019b). TP load reductions from street sweeping and catch basin cleaning is estimated in accordance with Appendix F of the 2016 Massachusetts Small MS4 General Permit as summarized by **Figure HI-1 and HI-2**.

$$\text{Credit}_{\text{sweeping}} = \text{IA}_{\text{swept}} \times \text{PLE}_{\text{IC-land use}} \times \text{PRF}_{\text{sweeping}} \times \text{AF} \qquad \textbf{(Equation 2-1)}$$

Where:

$\text{Credit}_{\text{sweeping}}$	=	Amount of phosphorus load removed by enhanced sweeping program (lb/year)
IA_{swept}	=	Area of impervious surface that is swept under the enhanced sweeping program (acres)
$\text{PLE}_{\text{IC-land use}}$	=	Phosphorus Load Export Rate for impervious cover and specified land use (lb/acre/yr) (see Table 2-1)
$\text{PRF}_{\text{sweeping}}$	=	Phosphorus Reduction Factor for sweeping based on sweeper type and frequency (see Table 2-3).
AF	=	Annual Frequency of sweeping. For example, if sweeping does not occur in Dec/Jan/Feb, the AF would be 9 mo./12 mo. = 0.75. For year-round sweeping, AF=1.0[1]

As an alternative, the permittee may apply a credible sweeping model of the Watershed and perform continuous simulations reflecting build-up and wash-off of phosphorus using long-term local rainfall data.

Table 2-3: Phosphorus reduction efficiency factors ($\text{PRF}_{\text{sweeping}}$) for sweeping impervious areas

Frequency[1]	Sweeper Technology	$\text{PRF}_{\text{sweeping}}$
2/year (spring and fall)[2]	Mechanical Broom	0.01
2/year (spring and fall)[2]	Vacuum Assisted	0.02
2/year (spring and fall)[2]	High-Efficiency Regenerative Air-Vacuum	0.02
Monthly	Mechanical Broom	0.03
Monthly	Vacuum Assisted	0.04
Monthly	High Efficiency Regenerative Air-Vacuum	0.08
Weekly	Mechanical Broom	0.05
Weekly	Vacuum Assisted	0.08
Weekly	High Efficiency Regenerative Air-Vacuum	0.10

Figure HI-1. Street Sweeping Calculation Methodology

$$\text{Credit}_{\text{CB}} = \text{IA}_{\text{CB}} \times \text{PLE}_{\text{IC-land use}} \times \text{PRF}_{\text{CB}} \qquad \textbf{(Equation 2-2)}$$

Where:

$\text{Credit}_{\text{CB}}$	=	Amount of phosphorus load removed by catch basin cleaning (lb/year)
IA_{CB}	=	Impervious drainage area to catch basins (acres)
$\text{PLE}_{\text{IC-and use}}$	=	Phosphorus Load Export Rate for impervious cover and specified land use (lb/acre/yr) (see Table 2-1)
PRF_{CB}	=	Phosphorus Reduction Factor for catch basin cleaning (see Table 2-4)

Table 2-4: Phosphorus reduction efficiency factor (PRF_{CB}) for semi-annual catch basin cleaning

Frequency	Practice	PRF_{CB}
Semi-annual	Catch Basin Cleaning	0.02

Figure HI-2. Catch Basin Cleaning Calculation Methodology

The Town of Milton also partners with the NepRWA to assist with river cleanups, which engage watershed residents. The Town of Milton has multiple programs to address water quality, including erosion and sediment control standards for construction projects, and post-construction water quality requirements.

Project-Specific Indicators

Number of BMPs Installed and Pollution Reduction Estimates:

Anticipated pollutant load reductions from ongoing (i.e., under construction) and future BMPs will be tracked as BMPs are installed. For example, it was estimated that the Algerine Corner BMP will result in a load reduction of approximately 8,871-14,962 lbs/yr of TSS, 33.7-56.9 lbs/yr of TP, and 186.5-315.1 lbs/yr of TN (Town of Milton 2021).

TMDL Criteria

TMDL requirements include the continuation of the NepRWA's CWMN monitoring program during both wet and dry weather. In addition, the TMDL requires development of a detailed monitoring plan and sampling associated with illicit discharge detection.

Direct Measurements

Direct measurements are generally expected to be performed in accordance with existing monitoring activities by the NepRWA's CWMN, as summarized below, along with additional recommendations to supplement sampling[10]. The CWMN includes nine core sampling sites within the Town of Milton that are sampled regularly. The locations of these sampling sites are identified in **Figure A-4** in **Element A** and include:

- "PTB028" "PTB035", and "PTB047"along Pine Tree Brook,
- "UNB014", "UNB16", "UNB002" along Unquity Brook, and
- "NER200", "NER185", "NER179" along the Neponset River

The CWMN also has seventeen additional "hot spot" sampling sites, along Pine Tree Brook, and nineteen "hot spot" sampling sites, along Unquity Brook, which are sampled based on anticipated needs. The locations of these sampling sites are identified in **Figure A-5** in **Element A.**

River Sampling

Regular sampling of the nine core sites in accordance with the CWMN will continue. Since there were two "hot spot" sampling sites along Pine Tree Brook that recently exhibited heightened levels of *E. coli* (see summary in Element A) and these locations are located downstream of the Wendell Brook BMPs, more frequent sampling (in accordance with the CWMN program) is recommended at these locations. It is also recommended to continue monitoring "hot spot" sampling site during and following the implementation of BMPs along Pine Tree Brook and Unquity Brook to help assess effectiveness of the BMPs.

Adaptive Management

Long-term goals will be re-evaluated at least **once every three years** and adaptively adjusted based on additional monitoring results and other indirect indicators. If monitoring results and indirect indicators do not show improvement to the TP and bacteria concentrations, as well as other indicators (e.g., DO) measured within the

[10] A full explanation of the CWMN, including sampling frequencies, parameters, and locations is provided at this link: https://www.neponset.org/your-watershed/cwmn-data/.

Town of Milton waterbodies, the management measures and loading reduction analysis (Elements A through D) will be revisited and modified accordingly.

Further, the Town of Milton and NepRWA will implement recommendations from this WBP and track overall progress. It is recommended that public education and outreach products reiterate goals of this WBP; summarize indirect indicators, project-specific indicators, and direct measurements as they relate to established water quality goals; and indicate ongoing outreach efforts and overall next steps.

References

314 CMR 4.00 (2013). "*Division of Water Pollution Control, Massachusetts Surface Water Quality Standards*"

ArcGIS (2020a). "*USA Soils Hydrologic Group*" Imagery Layer

ArcGIS (2020b). "*USA Soils Water Table Depth*" Imagery Layer

Environmental Partners Group (2013). "Stormwater BMP's, MA DEP 604(b) Program, Town of Milton, MA." Letter report prepared for the Neponset River Watershed Association, Canton, MA.

Geosyntec Consultants, Inc. (2020). "*Pine Tree Brook (Turners Pond) Watershed-Based Plan.*" Prepared for MassDEP. Dated June 2020.

MA Department of Revenue Division of Local Services (2016). "*Property Type Classification Codes, Non-arm's Length Codes and Sales Report Spreadsheet Specifications*" June 2016.

MassDEP (2002). "*Total Maximum Daily Loads of Bacteria for Neponset River Basin* "

MassDEP (2004). "*Weymouth and Weir River Basin 2004 Water Quality Assessment Report*"

MassDEP (2004). "*Neponset River Watershed 2004 Water Quality Assessment Report*"

MassDEP (2012). "*Massachusetts Year 2012 Integrated List of Waters Final Listing of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*"

MassDEP (2019). "*Massachusetts Year 2016 Integrated List of Waters Final Listing of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*" December 2019.

MassDEP (2020). "Water Quality Monitoring Program Data | Mass.gov"

MassGIS (1999). "*Networked Hydro Centerlines*" Shapefile

MassGIS (2001). "*USGS Topographic Quadrangle Images*" Image

MassGIS (2005). "*Elevation (Topographic) Data (2005)*" Digital Elevation Model

MassGIS (2007). "*Drainage Sub-basins*" Shapefile

MassGIS (2009a). "*Impervious Surface*" Image

MassGIS (2009b). "*Land Use (2005)*" Shapefile

MassGIS (2012). "*2010 U.S. Census Environmental Justice Populations*" Shapefile

MassGIS (2013). "*MassDEP 2012 Integrated List of Waters (305(b)/303(d))*" Shapefile

MassGIS (2015a). "*Fire Stations*" Shapefile

MassGIS (2015b). "*Police Stations*" Shapefile

MassGIS (2017a). "*Town and City Halls*" Layer

MassGIS (2017b). "*Libraries*" Layer

MassGIS (2020). "*Massachusetts Schools (Pre-K through High School)*" Datalayer

MassGIS (2021). "*Standardized Assessors' Parcels*" Mapping Data Set

NepRWA (2016). "*Unquity Brook Assessment Project Final Report*." Prepared for the Town of Milton. Dated June 30, 2016.

NepRWA (2021a). "*Citizen Water Monitoring Network (CWMN)*". https://www.neponset.org/your-watershed/cwmn-data/

NepRWA (2021b). "*Hot Spot Monitoring Program*". https://www.neponset.org/projects/hot-spot-program/

Schueler, T.R., Fraley-McNeal, L, and K. Cappiella (2009). "*Is impervious cover still important? Review of recent research*" Journal of Hydrologic Engineering 14 (4): 309-315.

Tetra Tech, Inc. (2015). "*Update of long-term runoff time series for various land uses in New England.*" Memorandum in Opti-Tool zip package. 20 November 2015. Available at: Opti-Tool: EPA Region 1's Stormwater Management Optimization Tool | US EPA

Town of Milton (2019a). "Project Final Report, Wendell Brook BMPs", 17-01/319, 2017—2019".

Town of Milton (2019b). "*Catch Basin Cleaning Optimization Plan*." Dated September 24, 2019.

Town of Milton (2019c). "*Town of Milton, MA Stormwater Management Program*." Revised in 2019.

Town of Milton (2020a). "*Year 2 Annual Report for Massachusetts Small MS4 General Permit*." Reporting Period: July 1, 2019-June30,2020.

Town of Milton (2020b). "*Stormwater Infrastructure Operation and Maintenance Program*". Town of Milton Department of Public Works. https://www.townofmilton.org/sites/g/files/vyhlif911/f/uploads/6-3_infra_om_wip.pdf

Town of Milton (2020c). “Lafayette Street Stormwater BMP Retrofit”, Section 319 Nonpoint Source Pollution Grant Program application.

Town of Milton (2021). “*Algerine Corner Stormwater BMP Construction 319 Nonpoint Source Pollution Grant Program*”, 17-01/319, 2017—2019”.

United States Geological Survey (2016). "*National Hydrography Dataset, High Resolution Shapefile*"

USDA NRCS and MassGIS (2012). "*NRCS SSURGO-Certified Soils*" Shapefile

USEPA (1986). "*Quality Criteria for Water (Gold Book)*" EPA 440/5-86-001. Office of Water, Regulations and Standards. Washington, D.C.

USEPA. (2010). "*EPA's Methodology to Calculate Baseline Estimates of Impervious Area (IA) and Directly Connected Impervious Area (DCIA) for Massachusetts Communities.*"

USEPA. (2015). “*Preventing Eutrophication: Scientific Support for Dual Nutrient Criteria*.”

USEPA. (2020). "*General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts (as modified); Appendix F – Requirements for MA Small MS4s Subject to Approved TMDLs.*" 7 December 2020.

Appendices

Appendix A – Stakeholder Meeting Minutes

Meeting Minutes

Project Name:	Milton/Unquity Brook Watershed-Based Plan (WBP)		
Location:	Unquity Brook Watershed (Milton, MA)		
Meeting Date, #:	December 13, 2021	Meeting Time:	2:30 – 4:00 PM
Prepared By: Distribution:	Emma Williamson All listed below	Meeting Location:	Zoom videoconference per Geosyntec invitation

Attendees:

Name	Organization	Contact Information
Julia Keay	Geosyntec Consultants, Inc.	JKeay@Geosyntec.com
Emma Williamson	Geosyntec Consultants, Inc.	EWilliamson@Geosynec.com
Judith Rondeau	Massachusetts Department of Environmental Protection (MassDEP)	judith.rondeau@mass.gov
Meghan Selby	MassDEP	meghan.selby@mass.gov
Marina Fernandes	Town of Milton Department of Public Works (DPW)	MFernandes@townofmilton.org
Lisa Ahern	Town of Milton	LAhern@townofmilton.org
Chase Berkeley	Town of Milton DPW	CBerkeley@townofmilton.org
Declan Devine	Neponset River Watershed Association (NepRWA)	devine@neponset.org
Meera	Town of Milton	Did not provide
Steve Ivas	Town of Milton Conservation Commission	spivas@comcast.net
Jay	Resident of Town of Milton	Did not provide
Jerry Burke	Resident of Town of Milton	Gbcbu.jb@gmail.com
Jimmy Coyne	Resident of Town of Milton	BPDIrish@gmail.com

"*This project has been financed with Federal Funds from the Environmental Protection Agency (EPA) to the Massachusetts Department of Environmental Protection (the Department) under an s. 319 competitive grant. The contents do not necessarily reflect the views and policies of EPA or of the Department, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.*"

Minutes to be considered final unless comments are received within five (5) business days.

AGENDA

- Greeting – Julia Keay, Geosyntec & Meghan Selby, MassDEP
- Watershed & Goals Overview (10 min) – Julia Keay, Geosyntec
- s. 319 Grant Project Spotlight (15 min) – Marina Fernandes, Town of Milton
- Brief Introductions from All Participants (15 min) – All
- Discussion of Completed, Ongoing, and Future Efforts (50 min) – All

WATERSHED & GOALS OVERVIEW
Julia Keay. Hi everyone. Thanks everybody for joining. This is a stakeholder meeting for the Unquity Brook watershed-based plan (WBP). Julia showed slide with agenda. This is meant to be more of a discussion; would like to get as much input as we can from you all. Purpose of this is the Town of Milton received Section 319 (s. 319) funding for construction of a BMP at Algerine Corner in Milton. A watershed-based plan (WBP) is needed for the watershed (Unquity Brook) in order to receive the s. 319 funding. As part of the WBP, we are having this meeting to get input on problem areas, projects, existing or proposed in the watershed. Meghan, is there anything you would like to add? **Meghan Selby.** WBP is required for the funding to come through s. 319. Once we have one in place, it will be easier to get implementation and funding for other projects, which will save effort, and help to get more projects built in the watershed. **Julia Keay.** Presented watershed and goals overview slides. Watershed is small (1.4 sq miles) and urban (83% urban), Unquity Brook is on the 2016 Integrated List for numerous impairments including total phosphorus (TP) and *E. Coli*. The long-term goals of the WBP will be based on TP and *E. Coli*. **Julia Keay.** Presented watershed maps. Unquity Brook flows into Gulliver's Creek, which flows into the Neponset River. Will show Google Earth later for any specific locations people want to show or identify. **Julia Keay.** Marina or Chase to give overview of project at Algerine Corner.
SECTION 319 GRANT PROJECT SPOTLIGHT
Marina Fernandes. Has presentation. Will share and give history. This presentation will be shown at the upcoming January New England Water Environment Association (NEWEA) conference. Brought up presentation. **Marina Fernandes.** Milton has great history of leveraging grant funding for stormwater. This project is the first s. 319 grant but have used CZM (Coastal Zone Management) grants before for all the studies that made this construction project realized. We have several green infrastructure projects already in place. These projects provided a history and understanding of what the construction entails for a project like this and the process of integration of stormwater BMP operations for Milton DPW. Milton has a stormwater utility, which puts us in a huge strategic position to maintain BMPs in the future. We have a yearly contract with a contractor to give list of operations and maintenance (O&M) plans and BMPs get maintained periodically according to the O&M plans. **Marina Fernandes.** Why Unquity Brook? Large breeding ground habitat for rainbow smelt. In 2016, we performed a water sample analysis at 18 sites, which identified that Unquity Brook has a wet weather issue. As part of the 2016 study, identified potential BMP sites; this included Algerine Corner, along with other BMP sites (Canton Ave Police Station and Cunningham School). The design of Algerine Corner is complete, hoping to use s. 319 grant for the construction of the project. Working on design at Cunningham School through CZM grant. Hoping to get a grant for the construction of that site as well. Milton Police Station BMP is constructed, which is almost like 2 BMPs-in-one; it treats 1.7 acres in one section and 5.8 acres in the other. **Marina Fernandes.** Algerine Corner has a 58-acre residential watershed. Unquity Brook is a diadromous fish habitat for rainbow smelt. The goal of the BMP design is to treat high levels of bacteria, nutrients, TSS and to provide an educational element for the neighborhood. Showed photos of site. Some challenges and concerns, including site constraints, public education, misinformation, public support, and abutter concerns. Trying to make it transparent and listen to concerns and questions they have at the site was a huge component of design, and a phase that has been completed. If you are interested in that process, please check out our website[1] which includes presentations, design, and answering questions relating to technical aspect and concerns of the public.

[1] Website: Algerine Corner - Stormwater BMP Proposed Design | Milton MA (townofmilton.org)

Marina Fernandes. Showed slide on technical design of the site and described the drain configuration and features. The BMP is designed to treat and infiltrate the 0.65" storm. Had originally hoped for 1" storm. Residents hope to preserve the three existing trees. The trees we are trying to maintain are the three pine trees in the middle of the site. The site is designed for drawdown of less than 48-hours as to not create a mosquito breeding ground. Showed another slide with site design. Showed schematic of site with additional vegetation and other features for the continuation of the use of the space by residents, as an open space.

Julia Keay. Marina, the time frame of January 2022 to January 2023 is correct?

Jay. Resident of Milton (Abutter). I had a question regarding the Algerine Corner. I'm a resident of Milton and live near the brook. Last time we all met, not sure how long ago, all residents showed up when they proposed this stormwater plan. All residents were opposed to it. Am I understanding that it is still going through even though it has been opposed?

Meghan Selby. This project has been awarded funding to move forward.

Jay. Right, and everyone was like "we picked Algerine Corner" and there was also another spot further down the road. And how it was left was that the residents said we would hate it if there was something here and would oppose it but we really haven't been able to speak our voices because we weren't given an option and we just never heard back to hear if it was actually going through.

Marina Fernandes. All the abutters received notification and there have been, since that meeting you talked about, other meetings and other public outreach in which we've talked to residents about the projects. Offered her email for further contact.

Jay. Right, and then do you know when construction would start?

Marina Fernandes. I think that's what Julia was asking me earlier so I can respond to that now.

Jerry Burke. Before you answer the question, I have a couple questions. Was recently a member of the conservation commission. Been very much opposed to this whole process as well as the actual proposed construction of the retention area. I just made a screenshot of what was brought up on the screen. First I have seen of it. Goes down the middle of a very shady area. Very disappointed, have not been receiving emails about this. I know DPW is aware of my strong opposition because we have talked in the past. I won't go into stealing this meeting, but it is disingenuous to say that the neighbors in the area of Algerine Corner have been brought into this process and have been kept up to date. Not at all accurate.

Meghan Selby. Did you say that you are currently a part of the conservation commission or were previously on it?

Jerry Burke. I was previously on it.

Meghan Selby. Has the project received a permit through the conservation commission?

Jerry Burke. No, they have not. This is clearly and unequivocally an Article 97 issue. What that means is that any change in the current use of Algerine Corner will require 2/3rd vote of legislature. I have a very strong reason to believe that the Town will ignore the requirement. I am throwing the gauntlet down now to every state person that is on this call, that this is an Article 97 issue. I say that as someone who wrote laws for MA senate for 19 years. Fully aware of the requirements.

Meghan Selby. Thank you for bringing up those topics. I am taking notes. I think that the Article 97 forum would be in front of the Town's conservation commission. Those concerns should be brought to them. If there are any concerns in terms of the wetlands protection act, that would be the forum as well. I did take the concerns now and we will do our best to take these into consideration. The s. 319 process is separate from the Town permitting process. Urge you to check in with Marina or other Town officials and make sure that your voice is heard there as well.

Meeting Minutes

Jerry Burke. It's going to be a local approval that will be required by the Select board. Every intention of making any approval by the conservation commission contingent upon Article 97. Thank you, and like I said, I'm not going to steal this meeting, but there are a lot of inaccuracies being presented here.

BRIEF INTRODUCTIONS FROM ALL PARTICIPANTS

Participants were asked to briefly address the following prompts:

- ⇒ Name?
- ⇒ Affiliation
- ⇒ Your connection to [name of watershed]?
- ⇒ Specific projects, public outreach, and/or monitoring work you do or have done

Julia Keay, Geosyntec. Project manager for this MA WBP project that we are doing with MassDEP. Will be overseeing the drafting and completion of this plan.

Emma Williamson, Geosyntec. Working on the project with Julia.

Meghan Selby, Nonpoint Source (NPS) Group at MassDEP (604b). Looking for local knowledge and info with the watershed, any data you might have or planned project. Goal to make a comprehensive WBP so we can make improvements to stormwater throughout the Town.

Judy Rondeau, Watershed Specialist and Outreach Coordinator for NPS at MassDEP. Here to provide outreach, technical support as WBP is developed. If any of the stakeholder have questions or require information, they can contact me.

Jimmy Coyne, lives at 1066 Brook Road, property on Unquity Brook, Town Meeting member. Quite surprised that no one from the Milton Parks and Recreation Department is on this call. Can someone tell me if recreation has approved the transfer of their ownership for this project?

Marina Fernandes. I don't believe they own that property.

Jimmy Coyne. It falls under the Milton Parks and Recreation. It is their property. Their representatives were at the meeting where we all stood around in a circle many moons ago.

Marina Fernandes. It is Town property; we have been working with Town council. We have a discussion with Town council. I don't believe it is Parks and Recreation department.

Jimmy Coyne. Well, I will probably dispute on that. I believe the property falls under Parks and Recreation guidelines so for them to transfer that it has to be voted on for the Parks and Recreation.

Marina Fernandes. I have Chase on the call from DPW and he probably knows a bit more than I do. When he has a chance to answer we can certainly defer to him.

Jimmy Coyne. I have one more question before we hear from Mr. Berkeley. When was last public meeting on this decision that any one of the abutters were part of, because as an abutter, I am well within one mile of Algerine Corner since the Brook does go through my back property? This is the first I am hearing of it; because Mr. Burke sent out an email to our group is why I am able to jump on this call.

Marina Fernandes. If you go to our website, you can see all of our questions and answers and when everything was responded to last. The last meeting was recorded and is available on the website[23]. Nothing happened since the information was included on website until we heard back on funding. Just heard that we received this grant about 3-4 weeks ago. We didn't know we needed a WBP as part of this grant. We scheduled this meeting for the last three weeks. Information on website is most up to date other than the fact that we have received the grant and the call was just scheduled. I was not aware that the project was open to the public. Julia, was that the intent of the call?

Julia Keay. No, it was not. We sent the invite to the emails that were sent to us from Town officials.

Marina Fernandes. I don't know if the intent is to make it a public meeting, I would rather it not to be or else I would like all the abutters to be part of this call and not a selected few. It is unfortunate that this meeting is turning into a selected few folks from the neighborhood. Again, I thought it was technical staff. My intention is to provide information to the public and again, not to a selected few.

Jimmy Coyne. Well can I just add that I find it surprising that a grant that was awarded funding a few weeks ago per your statement and I saw a slide for construction to begin January 2022.

Marina Fernandes. When you submit a grant, Mr. Coyne, you have to tell them when you would like the grant to happen so what the time would be, not for construction to start in January. There would be a bidding period to get costs associated with construction project. Bidding would happen in January/February depending on everything clearing up.

Jimmy Coyne. I only jumped in because I got this email.

Marina Fernandes. Who invited you?

Jerry Burke. I did.

Marina Fernandes. So, Mr. Burke, is it fair to say you forwarded this invitation to a few of your neighbors.

Jerry Burke. More than a few.

Meghan Selby. If I could just circle back for a second here. A couple different processes happening here. The s. 319 grant is the focus of this meeting and there are definitely other processes happening in Town. Just because the s. 319 grant was awarded, does not change any Town requirements, or mean that anything was approved locally or surpass any local requirements. Funding is only able to be used on a reimbursement status. The project will have to have all permits in place before s. 319 funding is available so there is still that avenue for any concerned citizens or abutters to go to meetings for those permits, to find out additional information, or voice any other concerns that might still be outstanding. Today's meeting is not to talk about the issues with the local permits. Those need to be vetted under open meetings with the specific Town boards. Today's focus is on creating a WBP plan which is a tool we use to plan out projects and come up with solutions and implementation projects to make the watershed healthier.

Julia Keay. Let's continue with the introduction. Keep in mind that this meeting is not just about that specific projects. We are also trying to understand other projects that are in the works or planned for the future within the watershed.

Chase Berkeley, Director of DPW for Town of Milton. Missed beginning, did catch some of the discussion. We want to tie up all these loose ends just as much as everybody else. We are still waiting for Town Council to issue opinions on Article 97, issue and they are doing all the diligence on the title of the property. Once we have those answers, we can certainly share them. Lots of unknowns. In the interest in preserving the project, we kept the project going in the meantime. We weren't going to wait

[2] Website: Algerine Corner - Stormwater BMP Proposed Design | Milton MA (townofmilton.org)
[3] Informational Meeting Recording: https://www.youtube.com/watch?v=gGMC1HCu9_k

for the attorney's opinion before taking the next steps. Hopefully it works out to everyone's favor. We do want to work with the abutting residents. Very polarizing issue. Happens with any type of invasive construction. Goal (DPW and Engineering Department) is to build the best project for the Town. We are not looking to upset anyone, but we have permit requirements and want to do our best to meet them.

Declan Devine, Environmental Scientist with NepRWA. Been monitoring water quality on Unquity Brook from 2003. We've done more targeted assessments in the past. Done scouting of potential BMP locations throughout the watershed. Did nutrient source identification analysis and report for all of the catchment areas in Milton. Nutrient source included in the file sent to Julia (GIS file and pdf report). Happy to talk further.

Julia Keay. Thanks for the information. You said the monitoring was from 2003 up until now?

Declan Decline. Yes, we have three long-term monitoring sites that measure *E. Coli*, nutrients, dissolved oxygen, and pH. And then in 2015/2016, we did a more targeted monitoring (through CZM grants) at 15 specific outfalls and location and testing for more parameters like surfactants and ammonia. Looking at source tracking with eDNA for human and dog waste.

Meera, Co-op with Town of Milton. Works with Chase and Marina and has been present for a lot of the meetings.

Steve Ivas, Conservation Agent for Town of Milton. 25 years ago, I was executive director of South River Watershed Association. Very impressed with the technology advances and would like to see the report [2015/2016 targeted monitoring] as well. There is an additional project adjacent to Unquity Brook at headwaters that Town is talking about now which is the addition of parking for Milton library at side of brook. The library would like to get done. Going through the process. I did some wetland flagging about a month ago, Town will pick up and look at how close it is. Parking will end up the hill between Police Station and Powder magazine. Directly across from Town Hall along Canton Ave. Library does need parking. Will be few years to be developed.

DISCUSSION OF COMPLETED, ONGOING, AND FUTURE PROJECTS

A general discussion was held on the following topics:

- ⇒ Past, current, or planned stormwater best management practice (BMP) projects in the watershed
- ⇒ Pollutant load reduction estimates for BMP projects
- ⇒ Water quality monitoring efforts
- ⇒ Potential pollution sources or problem areas
- ⇒ Public outreach and education
- ⇒ Additional grant funding available

Julia Keay. Hoping to have a discussion on items listed on slide. Already talked about some of it. Any pollutant load reduction estimates? I think we have it for the project that we were just discussion. If there are any reports or modelling that anyone knows of for other projects or watershed? Or water quality monitoring? Or problem areas? Any public education/outreach?

Julia Keay. Shared screen on Google Earth. Police Station BMP has been completed, Cunningham Elementary School in the works as another project. I have a question on Brook Rd and Center St project in 2016 report, is that project still going forward?

Marina Fernandes. Will be looking at that site next. Goal is to complete all of the facilities. From what I understand, much smaller watershed location. No conceptual design yet. Believes that the 2016 report only identified locations.

Julia Keay. May have been very rough concept in report.

Julia Keay. Confirmed location of public library parking project.

Steve Ivas. Parking may be across brook (hospital property) or further down Canton Ave. Opposite entry to Town Hall is where parking would be sited. This is something that I just found out about within the past month. Wetland flagged from Reedsdale to Canton Ave Side to Police Station along the brook (south side) then other side (Canton Ave) side to the Police Station.

Declan Decline. There is an existing BMP at library. In island in middle of parking lot. May be able to dig up records of another BMP project with tree box filters.

Steve Ivas. That it is another watershed (Pine Tree Brook).

Julia Keay. Any other locations?

Jerry Burke. Location on corner of Brook Road and Center St, opposite end of Center St from Algerine; more appropriate jump off than Algerine Corner. Area is vacant; lots of dead trees in there. Would be an improvement; would probably provide just as much filtration as Algerine Corner. I'm surprised that it is not further up on the list.

Marina Fernandes. Based on what study are you referring to?

Jerry Burke. Personal observations.

Julia Keay. Do you know the reason why the other location was prioritized?

Marina Fernandes. Cost-benefit analysis.

Julia Keay. I think the other one [Algerine Corner] had a larger drainage area.

Marina Fernandes. That is correct, and less grading requirement.

Steve Ivas. Jerry is correct that there is a lot of downed trees at the site. Direct abutters wanted coarse woody debris taken out, because they thought it was a source of rats. Do not believe that is the case but that is beside the point.

Julia Keay. Reason for downed trees? Erosion?

Steve Ivas. Not really; just storm damage and no one has picked them up. Hard to walk in there. Used to be landscaped garden. Previous abutter did flower planting. Old vestiges of landscape flowers. Directly across from Fondponte Academy.

Jerry Burke. Was private property that was granted to the Town +/- 20 years ago.

Chase Berkeley. That parcel is deeded to Conservation Commission directly. Lack of activity is the reason for its condition.

Jimmy Coyne. Chase, do you know who owns the deed at Center and Pleasant for Algerine Corner?

Chase Berkeley. We had Town council do due diligence on it. It came back initially as deeded to the Town of Milton only, with no designation to the Parks Department specifically, but they are researching that now and we are waiting on an opinion.

Jerry Burke. I have to correct you. Parcel was deeded to an individual that owned a lot of land; name escapes me right now. There are newspaper articles that go back 60 or 70 years, I will provide them for anyone who asks. Her wish was open space for use of children (although there is no restriction in the deed or covenant). 40 years ago, the Town wanted Fire Station, she [the parcel owner] wrote a letter saying she wanted the parcel to be used for open space, for use of kids in the neighborhood. It has been under control of Parks and Recreation. Subsequently, the fire station was not built. I did research on this (case law) and there are cases where, even without restricted covenants and deeds, this information is enough to preserve the use of the property. There is evidence, and I provided it, to show that there was an intent on how the land should be used and preserved. And she won the day when she was alive because the Town pulled intent to build the fire station.

Julia Keay. Any other comments or location?

Chase Berkeley. Unquity Brook is masonry lined for quite a bit of it through private property. I don't know if there's' opportunity to fix retaining walls. Pretty dated and could use some work if the work could quality as watershed effort to help improve things [and be covered under grant funding].

Meghan Selby. Focus is improving water quality and more specifically for the WBP, any efforts to improve water quality could be included, but for funding under s. 319 the focus is nonpoint source. Would need to check in with program manager for clarification. But might be a little bit of a stretch, unless if there is erosion or if the project could prevent erosion. Could be under healthy watershed as a whole for s. 319. But any potential work or issues should be included in WBP.

Julia Keay. Is there a specific stretch of the Brook?

Chase Berkeley. In the general vicinity where it comes out around Algerine Corner it is masonry lined through private property. Basically, stone walls. We have had instances where the walls collapsed into the stream. Probably overdue for maintenance to firm those up.

Julia Keay. Is that upstream or downstream of Algerine Corner?

Chase Berkeley. I would call it downstream. Goes between homes then cuts out onto Adams St. Probably 2 blocks to the right (east) of Algerine. Two stone walls holding up stream embankment, pretty beat up.

Steve Ivas. Would like to echo that concern, absolutely.

Declan Devine. There are a few parts of Unquity Brook that are completely underground through a culvert. Downstream of masonry-lined sections.

Steve Ivas. Underground in cemetery too for a long way, must be 1,000 feet to 1,500 feet perhaps. From pond. Down a good-sized bank. If you can find pond in cemetery, then it goes long way after that underground in culvert. Exists almost off cemetery property.

Julia Keay. Marked the locations on Google Earth.

Steve Ivas. Pointed out outlet location.

Steve Ivas. Quite a long section underground in the cemetery.

Jimmy Coyne. I am also part of cemetery trustees. The pond is visible on Google Earth and runs under the main road to the wooded area. There is a small detention pond at the backside of Edwards Avenue. There is also a small granite bridge with old ceramic piping running through it. Then there is an aboveground culvert with no retention. The small retention pond takes most of the flow from underground. The cemetery has access down that roadway.

Jimmy Coyne (cont'd). There is a single lane bridge with 48" or 60" pipes on both sides that allows flow to come down that area past Edwards Avenue and feeds down along Brook Road. All cemetery property. The stream goes back underneath 1000 Brook Road and travels underground. There is a large concrete receptacle there. DPW always cleans it out prior to big storms. The stream goes underneath Brook Road then feeds out to 1036 Brook Road then continues down behind 1054 Brook Road. DEP had issues with flood zone in that area. Happy to give email.

Julia Keay. Please put your email in chat.

Steve Ivas. There is a 12-foot-deep ditch along the rear property lines of Center St and Brook St folks. DEP is very sensitive about flood zones in that area. It is a soil ditch, basically. There is a beautiful concrete bridge there next to 1044.

Julia Keay. Are there erosion issues there?

Jimmy Coyne. Always. Only gotten bigger, brook has only gotten wider with erosion.

Jerry Burke. Brook has not been cleaned out. Would be a lot more oxygen in the water if the brook would be cleaned up.

Steve Ivas. We want woody debris in headwaters of creek for insects and invertebrates, but don't want it near people's homes. Quite a few trees in brook between Brook Rd and Gulliver's Creek.

Julia Keay. Other sections with major erosion issues?

Jimmy Coyne. Know few of neighbors of odd side properties of Brook Rd. Granite walls that have crumbled over time. When a storm comes through, it's amazing how fast it is going past properties, which has eroded the brook. It has pushed away the land on Center St side because of stone. The brook is probably not as straight as it used to be.

Steve Ivas. South of Algerine Corner, there are upper shelves that seem to be wearing away. Good size shelf on Algerine Corner now and wearing away shelf of silts that have built up in the past, at the location where the brook slows down during storm events [when the culvert backs up]. Flat areas accumulate sediment and steep areas accumulate rocks, gravel, and cobbles.

Julia Keay. Other areas with flooding issues or anything else? Any other locations?

Steve Ivas. Wanted to ask. When flagging the area near Cunningham Elementary School, I was informed by a Town resident that is the Collicot School?

Chase Berkeley. There are two schools there.

Steve Ivas. Worked on Pleasant St area. Due north area. Small pathway in there. There is a local-jurisdictional wetland. Opportunity across the pathway from the wetland to do something. Can't do anything to the wetland.

Julia Keay. Wanted to touch on last two bullets, public education and outreach. Any outreach efforts? Haven't looked at stormwater management program. Need to look at MS4 program for public education and outreach.

Declan Devine. Mailings in partnership with the Town (in MS4 permit) and educational program with 5th grade classes on stormwater and water conservation at public elementary schools (part of MS4). When the schools have a BMP, they try to take the class out to look at it.

Steve Ivas. Just public schools and not private schools?

Declan Devine. Pretty sure it's just public schools but will double-check.

Julia Keay. Is Cunningham the only public elementary school in Milton?

Jimmy Coyne. Glover School at Brook Road and Canton Avenue that abuts Turners Pond that has a brook that flows out of Turners Pond. Parking lot in front of school. Tucker School on Blue Hills Parkway. And major high school.

Julia Keay. Anything else on public education in the parks? Signage on dog waste (issue in watershed)?

Jimmy Coyne. Can't answer for parks and recs but no dogs allowed in the cemetery. Try to keep that strictly prohibited.

Julia Keay. Meghan, want to touch on anything for 604b program or s. 319 program?

Meghan Selby. Nonpoint source group for MassDEP, 604b is assessment and planning, s. 319 is focused on implementation and construction. Request for responses (RFR) for 604b is planned for February, so any projects that want to apply for funding, the deadline will be posted soon. And if you have any questions about what types of projects are fundable you can contact me at Meghan.Selby@mass.gov and can talk about projects until the RFR is released; then there is "cone of silence." If you have questions, get in touch with me or I can direct you to someone else who may have more information.

Julia Keay. Will also be sending meeting minutes out. Please put your email in the chat.

Jerry Burke. Regarding the use of Algerine Corner, the historical commission was nice to find articles about the conveyance of the corner to the Town and the history of it. I take issue with the way this information has been presented by certain individuals. Glad that Jim and I were able to weigh in and get the truth out there.

Julia Keay. Thank you everyone for taking the time to join and provide input. Can reach out to me, Emma, Meghan, or Judy. Thank you.

Contact: Julia Keay, JKeay@geosyntec.com
Emma Williamson, EWilliamson@geosyntec.com
Meghan Selby, Meghan.selby@mass.gov
Judith Rondeau, Judith.rondeau@mass.gov

Appendix B –Additional Information from the Neponset River Bacteria TMDL (MassDEP 2002)

Total Maximum Daily Loads of Bacteria for Neponset River Basin (MA73-02 - Neponset River; MA73-03 – Neponset River; MA73-04 – Neponset River; MA73-26 – Unquity Brook; MA73-29 – Pine Tree Brook; MA73-30 Gulliver Creek)
Problem Assessment Extensive water quality data are available for the Neponset River and tributaries. In 1994 the Massachusetts Department of Environmental Protection (MADEP), in cooperation with several other state agencies and citizen monitoring groups, initiated a comprehensive assessment of the Neponset River Basin. The results of this work identified that numerous waterbody segments, including lakes and ponds, in the Neponset River Basin were not attaining the State's water quality standards. The most pervasive water quality problem identified was, and remains, due to excessive levels of fecal coliform indicator bacteria. Since the 1994 study, the Neponset River Watershed Association (NepRWA), a non-profit organization, has collected annual water quality data at numerous locations throughout the basin. Beginning in 1996, all of NepRWA's monitoring activities have been conducted according to EPA approved Quality Assurance Project Plans (QAPP) developed by NepRWA. Establishing a QAPP represents a significant accomplishment by NepRWA that has resulted in the collection of credible data used to identify waterbody segments that do not attain water quality standards, and identify specific pollutant sources requiring control measures. The following figures (originally Figures 4 and 5 of the "Total Maximum Daily Loads of Bacteria for Neponset River Basin" report, 2002) provide the locations of MADEP (1994) and the NepRWA (1997 through 1999) sampling stations, respectively.

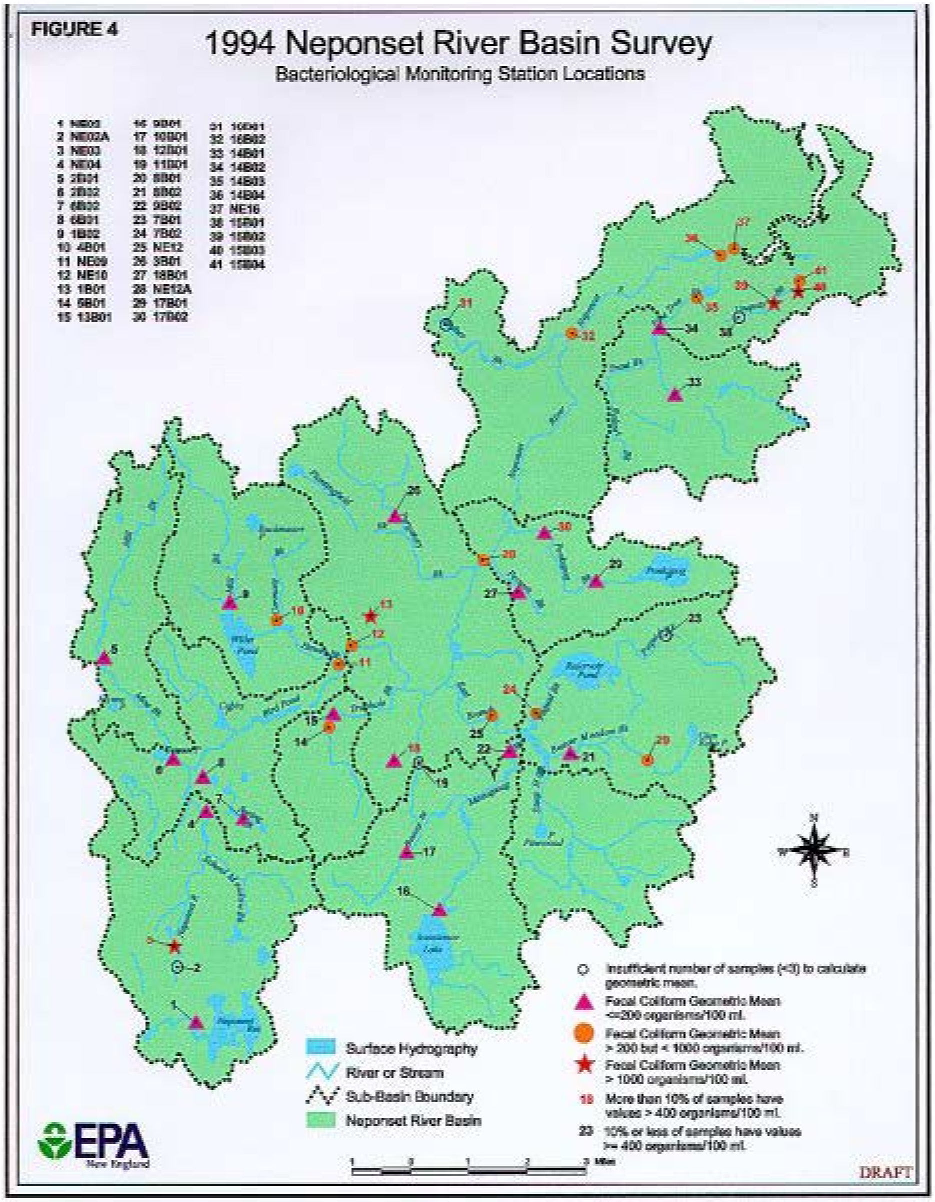
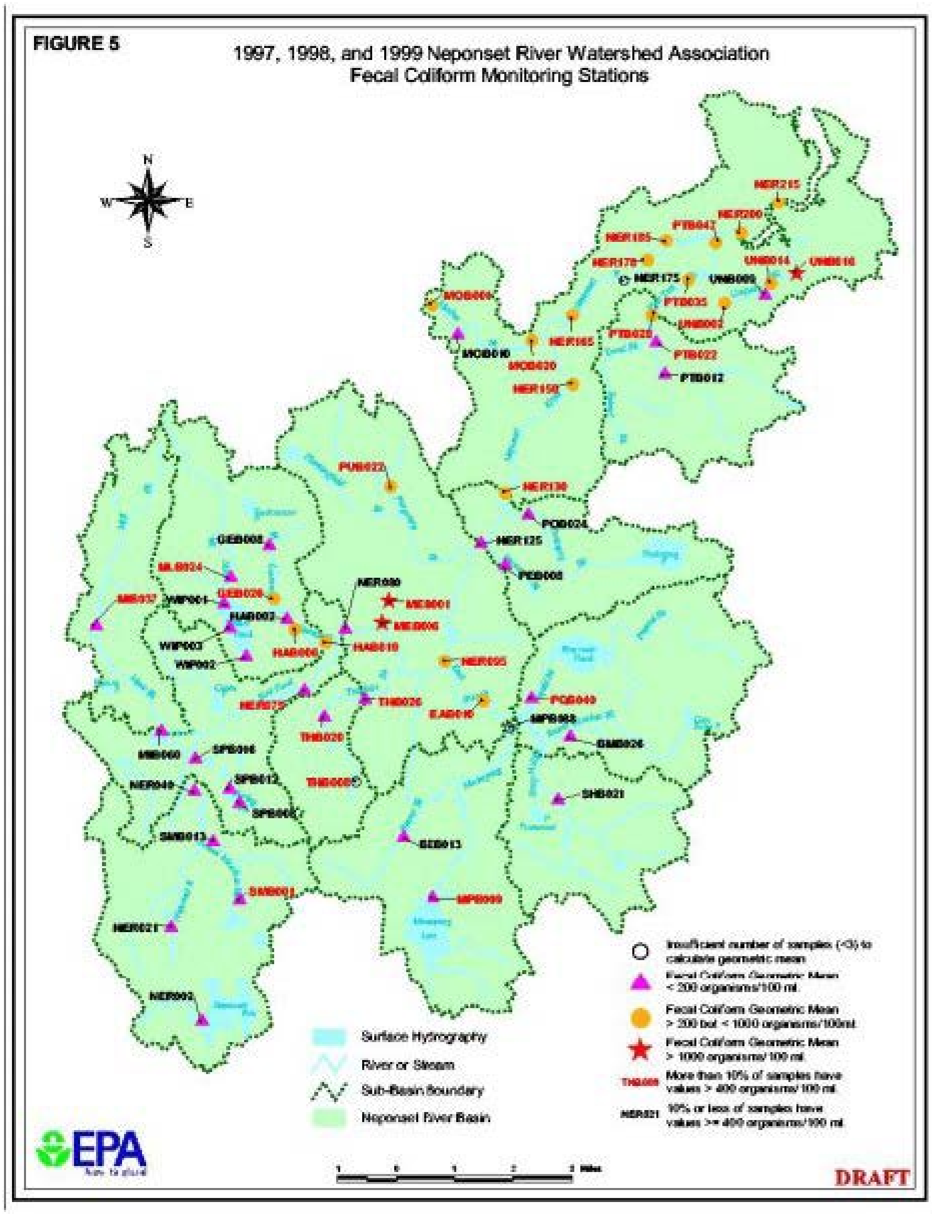


FIGURE 4
1994 Neponset River Basin Survey
Bacteriological Monitoring Station Locations
1 NE02
2 NE02A
3 NE03
4 NE04
5 2B01
6 2B02
7 6B02
8 6B01
9 1B02
10 4B01
11 NE09
12 NE10
13 1B01
14 5B01
15 13B01
16 9B01
17 10B01
18 12B01
19 11B01
20 8B01
21 8B02
22 9B02
23 7B01
24 7B02
25 NE12
26 3B01
27 18B01
28 NE12A
29 17B01
30 17B02
31 16B01
32 16B02
33 14B01
34 14B02
35 14B03
36 14B04
37 NE16
38 15B01
39 15B02
40 15B03
41 15B04
Insufficient number of samples (<3) to calculate geometric mean.
Fecal Coliform Geometric Mean <=200 organisms/100 ml.
Fecal Coliform Geometric Mean > 200 but < 1000 organisms/100 ml.
Fecal Coliform Geometric Mean > 1000 organisms/100 ml.
18 More than 10% of samples have values > 400 organisms/100 ml.
23 10% or less of samples have values >= 400 organisms/100 ml.
Surface Hydrography
River or Stream
Sub-Basin Boundary
Neponset River Basin
EPA
New England
DRAFT



Fecal Contamination of the Neponset River Basin

The NepRWA annual water quality monitoring program and the 1994 MADEP monitoring efforts provide an extensive bacterial monitoring coverage throughout the basin. Between 1997 and 1999, NepRWA established and monitored 57 surface water stations, and MADEP monitored 41 stations for bacteria in 1994. The locations of the MADEP and NepRWA (1997-1999) bacteria monitoring stations are provided in the figures above (originally Figures 4 and 5 of "Total Maximum Daily Loads of Bacteria for Neponset River Basin" report, 2002), respectively, illustrating the extensive coverage of the monitoring programs. Individual data may be found in The Neponset River Watershed, 1994 Resource Assessment Report, dated October 1995 and the NepRWA annual monitoring reports. The figures illustrate the extent of non-attainment of the fecal coliform standards in the Neponset River and tributaries. Monitoring stations are depicted where the geometric means exceed 200 organisms per 100 ml and/or where more than 10 % of the samples have values exceeding 400 organisms per 100ml. For the NepRWA stations (1997 –1999), Figure 5 indicates the highest geometric mean of the three years. As indicated, the entire length of the Neponset River, starting near Route 1 in Foxborough downstream to the estuary, and several tributaries do not meet the fecal coliform standards. Also, numerous tributaries were found to be in non-attainment. Exceedences of the fecal coliform criteria were observed at 60% of the NepRWA stations for one or more years, and at 51% of the 1994 MADEP stations. The high percentage of NepRWA stations exceeding fecal coliform criteria is not surprising, considering that, to aid in source identification efforts, NepRWA targeted its monitoring activities in areas with known or suspected problems.

The following tables (originally Tables 4 through 7 of the "Total Maximum Daily Loads of Bacteria for Neponset River Basin" report, 2002) present the calculated geometric means and percent of samples exceeding 400 organisms per 100 ml for each location in 1994, 1997, 1998, and 1999.

STATION ID	STATION LOCATION	NO. OF SAMPLES COLLECTED	GEOMETRIC MEAN	% OF SAMPLES > 400 (cfu/100 ml)
TABLE 1994 DEP NEPONSET RIVER SURVEY FECAL COLIFORM				
NE02	Neponset River, outlet of Crackrock Pond, Foxborough	3	36	33
NE02A	Neponset River, Route 1, Foxborough	2	-	0
NE03	Neponset River, Summer Street, Walpole	4	1544	100
NE04	Neponset River, South Street, Walpole	3	47	0
2B02	Mine Brook, Mill Pond Road, Walpole	3	<20	0
2B01	Mine Brook, Elm Street, Medfield	3	106	0
6B01	Spring Brook, off Route 27, near playground, Walpole	2	23	0
6B02	Spring Brook, Washington Street, Walpole	3	34	0
NE09	Hawes Brook, Washington Street, Norwood	3	212	33
4B01	Germany Brook, Inlet Ellis Pond, Nichol Street, Norwood	3	410	67
1B02	Mill Brook, inlet Pettee Pond off Clearwater Drive, Brook Street, Westwood	3	92	0
NE10	Neponset River, Pleasant Street Bridge, Norwood	3	855	100
1B01	Meadow Brook, off Meadow Brook Road/Pleasant Street, Norwood	4	85,225	100
5B01	Traphole Brook, Cooney Street, Walpole	3	298	33
12B01	Unnamed Traphole tributary, Union Street and Edge Hill Road, Sharon	3	99	33
13B01	Unnamed Traphole tributary, Union Street, Walpole	3	108	0
11B01	Unnamed Neponset tributary, Edge Hill Road, Sharon	1	-	0
NE12	East Branch Neponset River, Neponset Street, Canton	3	300	0
9B02	Massapoag Brook, Walnut Street off Washington Street, Canton	3	20	0
10B01	Beaver Brook, Upland Road, Sharon	3	78	0
9B01	Massapoag Brook, outlet of Massapoag Lake, Sharon (Cedar, East & Massapoag Street)	3	58	0
7B02	Pequid Brook, Sherman Street, Canton	3	203	33
7B01	Pequid Brook, York Street, Canton	1	-	0
8B02	Beaver Meadow Brook, Pine Street, Canton	3	54	0
8B01	Beaver Meadow Brook, Route 138, Canton	3	288	67
3B01	Purgatory Brook, Route 1 near Everett Street, Norwood	3	154	33
NE12A	Neponset River, Dedham Street Bridge, Canton	3	456	33
18B01	Pecunit Brook, Elm Street, Canton	3	43	0
17B02	Ponkapoag Brook, Elm Street, Canton	3	199	33
17B01	Ponkapoag Brook, Washington Street, Canton	3	56	0
16B02	Mother Brook, Hyde Park Avenue, Hyde Park	4	204	25
16B01	Mother Brook, Washington Street, Dedham	2	-	50
14B04	Pine Tree Brook, Central Avenue, Milton Village	3	420	67
14B03	Pine Tree Brook, Central Avenue, Milton	3	768	67
14B02	Pine Tree Brook, Blue Hills Parkway, Milton	3	113	0
14B01	Pine Tree Brook, Unquity Road and Harland Street, Milton	3	90	0
NE16	Neponset River, downstream of Baker Dam, Adams Street, Milton/Boston line	3	593	67
15B04	Gulliver Creek, Christopher Avenue, Milton	3	512	67
15B03	Unquity Brook, Adams Street, Milton	2	-	0
15B02	Unquity Brook, Brook Road, Milton	2	-	100
15B01	Unquity Brook, Gun Hill Street off Randolph Avenue, Milton	1	-	0

TABLE 1997 NEPONSET RIVER FECAL COLIFORM DATA				
STATION ID	**STATION LOCATION**	**NO. OF SAMPLES COLLECTED**	**GEOMETRIC MEAN**	**% OF SAMPLES > 400 (cfu/100 ml)**
SMB001	School Meadow Brook at Pine Street, Walpole	6	5	0
SMB013	School Meadow Brook at Washington Street, Walpole	6	123	16.7
SPB008	Spring Brook at Washington Street, Walpole	6	11	0
SPB012	Spring Brook at Stone Street, Walpole	6	7	0
GEB008	Germany Brook at Sycamore Drive, Westwood	6	30	0
GEB020	Germany Brook at inlet of Ellis Pond, Norwood	5	961	80
NER075	Neponset River at Hollingsworth and Vose Dam, Walpole	5	33	0
HAB002	Hawes Brook at Walpole Street, Norwood	6	42	16.7
HAB006	Hawes Brook at Railroad Bridge/Endean Park, Norwood	6	771	83.3
HAB010	Hawes Brook at Washington Street, Norwood	5	651	80
MEB001	Meadow Brook at Sunnyside Road, Norwood	6	9432	100
MEB006	Meadow Brook at Dean Street, Norwood	5	1278	60
THB008	Traphole Brook at High Plain Street, Sharon	2	51	50
THB020	Traphole Brook at Coney Street, Walpole	6	87	16.7
THB026	Traphole Brook at Sumner Street, Norwood	6	141	16.7
NER095	Neponset River at Neponset Street, Canton	4	224	50
MOB001	Mother Brook at Route One Dam, Dedham	6	123	33.3
MOB010	Mother Brook at Bussey Street, Dedham	4	74	0
MOB020	Mother Brook at River Street, Hyde Park/Boston	3	391	33.3
NER130	Neponset River at Green Lodge Street, Canton	4	92	0
NER150	Neponset River at Paul's Bridge, Milton	4	89	0
NER165	Neponset River at Dana Avenue, Hyde Park/Boston	3	655	100
NER175	Neponset River at Truman Parkway, Mattapan/Boston	1	110	0
NER185	Neponset River at Ryan Playground, Mattapan/Boston	6	1168	83.3
PTB012	Pine Tree Brook at Unquity Road, Milton	5	168	0
PTB022	Pine Tree Brook at Canton Avenue, Milton	5	194	20
PTB035	Pine Tree Brook at Brook Road, Milton	6	418	50
PTB047	Pine Tree Brook at Eliot Street, Milton	5	645	80
UNB002	Unquity Brook at Randolph Avenue, Milton	5	668	60
UNB009	Unquity Brook at Brook Road, Milton	5	76	0
UNB016	Unquity Brook at Squantum Street, Milton	6	1533	100
NER200	Neponset river at Adams Street Bridge, Milton/Boston Line	6	523	66.7

TABLE 1998 NEPONSET RIVER SURVEY
FECAL COLIFORM DATA

Station ID	Station Description	Dry Weather Geometric Mean	No. of Dry Samples	Wet Weather Geometric Mean	No. of Wet Samples	Overall Geometric Mean	Overall % > 400 cfu/100ml)
NER021	Neponset River at Sumner Street, Walpole	132	6	247	4	170	10
MIB060	Mine Brook at Mill Pond Road, Walpole	10	6	12	4	11	0
NER075	Neponset River at Hollingsworth and Vose Dam, Walpole	71	6	93	3	78	0
GEB020	Germany Brook at inlet of Ellis Pond, Norwood	169	3	1111	4	495	57
HAB006	Hawes Brook at Railroad Bridge/Endean Park, Norwood	290	5	571	4	392	67
HAB010	Hawes Brook at Washington Street, Norwood	156	5	1212	4	388	44
MEB001	Meadow Brook at Sunnyside Road, Norwood	7573	6	9813	4	8400	100
MEB006	Meadow Brook at Dean Street, Norwood	1574	6	3812	4	2242	90
NER130	Neponset River at Green Lodge Street, Canton	158	6	314	4	208	20
EAB010	East Branch at Neponset Street, Canton	269	5	617	4	389	44
NER150	Neponset River at Paul's Bridge, Milton	119	5	825	4	281	44
NER165	Neponset River at Dana Avenue, Mattapan	265	6	718	4	395	50
NER178	Neponset river at Monponset Street, Mattapan	184	4	1259	2	349	33
NER185	Neponset River at Ryan Playground	607	5	1202	4	822	44
PTB022	Pine Tree Brook at Canton Avenue, Milton	117	6	307	4	172	30
PTB028	Pine Tree Book at Blue Hill Parkway, Milton	128	4	474	4	246	50
PTB035	Pine Tree Brook at Brook Road, Milton	218	5	562	3	311	38
UNB002	Unquity Brook at Randolph Avenue, Milton	309	6	2424	4	704	50
UNB014	Unquity Brook at Adams Street, Milton	109	4	1849	4	449	50
UNB016	Unquity Brook at Squantum Street, Milton	487	6	4491	4	1293	60
NER200	Neponset River at Adams Street Bridge, Milton	179	4	1060	4	436	50
NER215	Neponset river at Granite Avenue, Milton	634	5	648	4	640	33

TABLE 1999 NEPONSET RIVER FECAL COLIFORM DATA				
STATION ID	STATION LOCATION	NO. OF SAMPLES COLLECTED	GEOMETRIC MEAN	% OF SAMPLES > 400 (cfu/100 ml)
PUB022	Purgatory Brook at Rte. 1A, near Everett St., Westwood	4	257	25
NER125	Neponset River at Dedham St. Bridge, Canton	4	164	0
PEB008	Pecunit Brook at Elm St., Canton	4	90	0
POB024	Ponkapoag Brook at Washington St., Canton	4	15	0
NER150	Neponset River at Paul's Bridge, Milton	3	94	0
MOB001	Mother Brook At Route One Dam, Dedham	4	358	50
NER165	Neponset River at Dana Avenue, Hyde Park/Boston	4	197	25
NER185	Neponset River at Ryan Playground, Mattapan/Boston	4	338	50
PTB028	Pine Tree Brook at Blue Hill Parkway, Milton	4	71	0
PTB035	Pine Tree Brook at Brook Road, Milton	5	125	0
PTB047	Pine Tree Brook at Central Ave., Milton	4	259	25
NER200	Neponset River at Adams Street Bridge, Milton	4	469	50
UNB002	Unquity Brook at Randolph Avenue, Milton	7	972	71
UNB014	Unquity Brook at Adams Street	5	309	40
UNB016	Unquity Brook at Squantum Street, Milton	3	452	67
NER002	Neponset River at Outlet of Crackrock Pond, Walpole	3	7	0
NER040	Neponset River at South St., Walpole	3	185	0
MIB037	Mine Brook at Elm St., Medfield	4	125	25
SMB013	School Meadow Brook at Washington Street, Walpole	4	173	0
SPB016	Spring Brook at Rte. 27, Walpole	4	165	0
NER075	Neponset River at Hollingsworth and Vose Dam, Walpole	4	55	0
MLB024	Mill Brook at inlet of Petee's Pond, Westwood	4	84	25
WIP001	Willett Pond, northern site, Walpole	4	53	0
WIP002	Willett Pond, Southern Site, Walpole	4	17	0
WIP003	Willett Pond, Eastern site, Walpole	4	11	0
GEB020	Germany Brook at inlet of Ellis Pond, Norwood	4	93	0
HAB002	Hawes Brook at Walpole Street, Norwood	4	60	0
HAB006	Hawes Brook at Railroad Bridge/Endean Park, Norwood	3	117	0
HAB010	Hawes Brook at Washington Street, Norwood	3	238	0
NER080	Neponset River at Pleasant St. Bridge, Norwood	4	152	0
MEB001	Meadow Brook at Sunnyside Road, Norwood	4	4086	100
THB020	Traphole Brook at Coney Street, Walpole	4	65	0
BEB013	Beaver Brook at Upland Road, Sharon	4	39	0
MPB009	Massapoag Brook at outlet Lake Massapoag, Sharon	4	101	25
MPB088	Massapoag Brook at Walnut St., Canton	2	-	0
SHB021	Steep Hill Brook, at Central St, & West St., Stoughton	4	69	0
BMB026	Beaver Meadow Brook at Pine St., Canton	4	166	0
PQB040	Pequit Brook at Sherman St., Canton	4	184	25
EAB010	East Branch at Neponset St., Canton	4	188	25

Consistent with the Water Quality Standards for fecal coliform, data are summarized and presented in terms of a geometric mean, which is often used as a measure of central tendency for bacteria data. Review of these data reveal that many of the same segments continuously exceed standards indicating the presence of relatively consistent bacteria sources. These data clearly illustrate the impacts of urbanization on ambient bacteria levels since the more developed areas of the watershed typically have the higher bacteria levels. By contrast, low fecal coliform levels are observed in the less developed subwatersheds (i.e., Mine Brook). These data are useful for estimating the natural background contribution for both dry and wet weather conditions.

The majority of the existing data represent dry weather conditions. These data are valuable for identifying dry weather sources of bacteria such as leaking sewers and illicit sewer connections, but are limited for assessing the overall quality of surface waters because there are also impacts associated with wet weather sources. NepRWA was successful in monitoring four wet weather events during the 1998 sampling season. These data are extremely useful to begin documenting the magnitude of wet weather impacts, and give a more complete assessment of the waterbodies during all weather and flow conditions. To illustrate the relative magnitudes of dry and wet weather bacteria levels, the 1998 data table (originally Table 6 of the “Total Maximum Daily Loads of Bacteria for Neponset River Basin” report, 2002) provides separate geometric means for dry and wet weather conditions. As expected, the wet weather geometric means are typically significantly greater than the dry weather geometric means reflecting the inputs of wet weather sources such as storm water runoff and the flushing of materials from piped drainage systems.

Also, the 1997 data are particularly informative because they are representative of drought-like conditions when river flows and the pollutant assimilative capacity were very low. Comparison of the 1997 and 1998 dry weather geometric means reveals that, for most stations, the 1997 dry weather geometric means are notably higher than the 1998 dry weather geometric means.

Stream Base Flow and In-Stream Fecal Coliform Levels

The Neponset River Basin fecal coliform data illustrate the relationship between stream base flow quantity and in-stream bacteria concentrations. As stream base flow (flow in stream channel during dry weather conditions) declines bacteria concentrations typically increase. This relationship is due primarily to the fact that stream base flow is composed mostly of ground water flow entering the stream channel.

The very low concentrations of bacteria in ground water due to the natural filtering action of the soil matrix through which ground water flows effectively dilutes bacterial wastes from other sources that may be entering the stream during dry weather conditions. Individual bacteria data collected from the Meadow Brook system in Norwood clearly illustrate this relationship.

Small urbanized watershed systems like Meadow Brook are particularly vulnerable to declining base flows following extended dry weather conditions. In the case of Meadow Brook the highly impervious cover of the watershed and the presence of an antiquated sewer system which carries sanitary sewage and ground water infiltration out of the basin to the MWRA's Deer Island Wastewater Treatment Facility contribute to reduced base flow. The high percentage of impervious cover in the watershed significantly reduces the opportunity for rainwater to percolate into the ground and recharge ground water which in turn recharges stream base flow. Instead much of the rainfall is converted to storm water runoff which quickly passes out of the system.

The importance of maintaining and restoring stream base flow through protecting and enhancing ground water recharge to protect and improve water quality as well as effectively manage municipal storm water will be discussed in the TMDL implementation section of this document.

Identification of Fecal Coliform Bacteria Sources

Largely through the efforts of the NepRWA, the stream teams (citizen monitoring groups active in several subwatersheds of the Neponset River watershed), and MADEP field staff, numerous point and nonpoint sources of fecal contamination have been identified. The following table (originally Table 8 of “Total Maximum Daily Loads of Bacteria for Neponset River Basin” report, 2002) summarizes the river segments impaired due to measured fecal coliform contamination and identifies suspected and known sources. Dry weather sources include leaking sewer pipes, storm water drainage systems (illicit connections of sanitary sewers to storm drains), and failing septic systems. Wet weather sources include storm water runoff and sanitary sewer overflows.

Table : Summary of Fecal Coliform Contamination in the Neponset River Watershed

Location	Known and Suspected Sources
Upper Neponset River	Storm water runoff and failing septic systems and
Hawes and Germany Brooks	Illicit sewer connections, sanitary sewer overflows, and storm water runoff.
East Branch Neponset River, Pequid & Beaver Meadow Brooks	Illicit sewer connections, storm water runoff, and failing septic systems.
Steep Hill Brook	Illicit sewer connections, storm water runoff, and failing septic systems.
Middle Neponset River and Meadow Brook	Leaking sewers, illicit sewer connections, storm water runoff, and failing septic systems.
Traphole Brook	Illicit sewer connections, storm water runoff, and failing septic systems.
Purgatory Brook	Illicit sewer connections, sanitary sewer overflows, storm water runoff, and failing septic systems.
Ponkapoag Brook	Illicit sewer connections, storm water runoff, and failing septic systems.
Lower Neponset River	Illicit sewer connections and storm water runoff.
Mother Brook	Illicit sewer connections and storm water runoff.
Pine Tree Brook	Sanitary sewer overflows, illicit sewer connections, storm water runoff, and failing septic systems.
Neponset River Estuary, Unquity & Gullivers Brooks	Illicit sewer connections, sanitary sewer overflows, storm water runoff, and failing septic systems.

The NepRWA has effectively used its monitoring program to identify bacteria sources and initiate the implementation of necessary controls. For example, the elevated fecal coliform levels in Meadow Brook have been traced to leaking sewers with under-drains that transport sewage to the storm drainage system and to Meadow Brook. Norwood has corrected portions of the faulty sewer system and obtained additional funding to continue repair work.

There are no permitted point source discharges of fecal coliform within the Neponset River Basin. However, a number of nonpoint and non-permitted point pollutant sources do exist. Nonpermitted point sources include piped storm water drainages systems and sanitary sewer overflows. Possible nonpoint sources include, diffuse storm water runoff, leaking sewers, and failing or inadequate septic systems depending on the nature of the discharge to surface waters (discrete or diffuse).

It is difficult to provide accurate quantitative estimates of fecal coliform contributions from the various sources in the Neponset River Basin because many of the sources are diffuse and intermittent, and extremely difficult to monitor or accurately model. Therefore, a general level of quantification according to source category is provided. This approach is suitable for the TMDL analysis because it indicates the magnitude of the sources and illustrates the need for controlling them. Additionally, many of the sources (failing septic systems, leaking sewer pipes, sanitary sewer overflows, and illicit sanitary sewer connections) are prohibited because they indicate a potential health risk and, therefore, must be eliminated. However, estimating the magnitude of overall bacteria loading (the sum of all contributing sources) is achieved for wet and dry conditions using the extensive ambient data available that define baseline conditions.

Leaking sewer pipes, illicit sewer connections, sanitary sewer overflows (SSOs), and failing septic systems represent a direct threat to public health since they result in discharges of partially treated or untreated human wastes to the surrounding environment. Quantifying these sources is extremely speculative without direct monitoring of the source because the magnitude is directly proportional to the volume of the source and its proximity to the surface water. Typical values of fecal coliform in untreated domestic wastewater range from 104 to 106 MPN/100ml.

Illicit sewer connections into storm drains result in direct discharges of sewage via the storm drainage system outfalls. The existence of illicit sewer connections to storm drains is well documented in many urban drainage systems, particularly older systems that may have once been combined. In collecting information to support its Municipal Storm Water NPDES Permit application, the Boston Water and Sewer Commission (BWSC) identified and eliminated fiftyseven illicit connections within the Neponset Basin during 1994 and 1995 (MADEP, 1995).

Since 1997 BWSC has corrected nine illicit connections eliminating an estimated 12,550 gallons per day of sanitary sewage from the storm drainage system and there are two additional illicit connections that have been assigned to a contract for repair (BWSC, 2000). It is probable that numerous other illicit sewer connections exist in storm drainage systems serving the older developed portions of the basin. Monitoring of storm drain outfalls during dry weather is needed to document the presence or absence of sewage in the drainage systems. NepRWA has been active in monitoring storm drain outfalls that has led to the identification of several illicit connections. All communities in the Neponset Basin are subject to the Storm water Phase II Final Rule that will require the development and implementation of an illicit discharge detection and elimination plan.

Storm water runoff is another significant contributor of fecal coliform pollution. During rain events, fecal matter from domestic animals and wildlife are readily transported to surface waters via the storm water drainage systems and/or overland flow. The natural filtering capacity provided by vegetative cover and soils is dramatically reduced as urbanization occurs because of the increase in impervious areas (i.e., streets, parking lots, etc.) in the watershed.

Extensive storm water data have been collected and compiled both locally and nationally in an attempt to characterize the quality of storm water. Bacteria are easily the most variable of storm water pollutants, with concentrations often varying by factors of 10 to 100 during a single storm. The following table (originally Table 9 and 10 of "Total Maximum Daily Loads of Bacteria for Neponset River Basin" report, 2002) summarizes wet weather sampling results of five storm drain outfalls in the Neponset River Basin and provides observed ranges of fecal coliform in storm water from different land uses during two storms monitored in the Wachusett Reservoir.

Table Wet Weather Storm Drain Sampling – Neponset River Basin (1) (MA DEP, 2000)

Land Use Category	Fecal Coliform Organisms / 100 ml	Enterococcus	E. Coli
Residential	< 16 – 25,000	340 – 70,000	<16 – 4,000
Forest/Urban Open	410 – 31,000	2,500 – 45,000	41 – 22,000
Commercial	16 – 5,600	120 – 2,300	<16 – 1,200
Industrial	600 – 3,600	880 – 11,000	130 – 3,000

(1) Grab samples collected for four storms between September 15, 1999 and June 7, 2000.

Table Wachusett Reservoir Storm Water Sampling MDC-CDM Wachusett Storm Water Study (June 1997)

Land Use Category	Fecal Coliform Bacteria (1) Organisms / 100 ml
Agriculture, Storm 1	110 - 21,200
Agriculture, Storm 2	200 - 56,400
"Pristine" (not developed, forest), Storm 1	0 - 51
"Pristine" (not developed, forest), Storm 2	8 - 766
High Density Residential (not sewered, on septic systems), Storm 1	30 - 29,600
High Density Residential (not sewered, on septic systems), Storm 2	430 - 122,000

Considering this variability, storm water bacteria concentrations are difficult to accurately predict. Caution must be exercised when using values from single wet weather grab samples to estimate the magnitude of bacteria loading because it is often unknown whether the sample is representative of the "true" mean. To gain an understanding of the magnitude of bacterial loading from storm water and avoid overestimating or underestimating bacteria loading, event mean concentrations (EMC) are often used. Typical storm water event mean densities for various indicator bacteria are provided in the following tables (originally Table 11 and 12 of "Total Maximum Daily Loads of Bacteria for Neponset River Basin" report, 2002). These EMCs illustrate that storm water bacteria concentrations from certain land uses (i.e., residential) are typically at levels sufficient to cause water quality problems.

NepRWA has begun to quantify the magnitude and extent of fecal contamination in the Neponset Basin during wet weather conditions. With the exception of two sampling stations, Mine Brook (MIB060) and the Neponset River at Hollingsworth and Vose (NER075), excessive levels of fecal coliform were observed at all stations highlighting the need for improved storm water management. The extent of urbanized land cover in the Neponset Basin in conjunction with the fecal coliform EMCs in the following tables (originally Tables 11 and 12 respectively of "Total Maximum Daily Loads of Bacteria for Neponset River Basin" report, 2002), supports the assertions that storm water runoff is a significant cause contributing to the non-attainment of designated uses, and that reductions of wet weather bacteria sources are warranted. However, since wet weather data in the Neponset Basin remains limited, a progressive implementation of the TMDL is proposed to address wet weather bacteria sources. This approach requires estimating the pollutant reductions necessary to meet water quality standards using the best available information and allows controls to be implemented while additional data are collected.

Table: Storm Water Event Mean Bacteria Concentrations (2)
The Lower Basin of the Charles River

Land Use Category	Fecal Coliform Bacteria (Organisms / 100 ml)	Enterococcus Bacteria (Organisms / 100 ml)
Single Family Residential	2,845 – 93,950	5,456 – 86,679
Multifamily Residential	2,185 – 30,624	3,176 – 49,405
Commercial	682 – 27,670	2,134 – 35,489

(2) Event Mean Densities for eight storms sampled during 2000 by USGS.

Table: Storm Water Event Mean Fecal Coliform Concentrations (3)

Land Use Category	Fecal Coliform Bacteria (3) Organisms / 100 ml
Single Family Residential	37,000
Multifamily Residential	17,000
Commercial	16,000
Industrial	14,000

(3) Derived from NURP study event mean concentrations and nationwide pollutant buildup data

Septic systems designed, installed and maintained in accordance with 310 CMR 15.000: Title 5, are not significant sources of fecal coliform bacteria. Studies demonstrate that wastewater located four feet below properly functioning septic systems contain on average less than one fecal coliform bacteria organism per 100 ml (Ayres Associates, 1993). Failed or non-conforming septic systems, however, can be a major contributor of fecal coliform to the Neponset River and tributaries. Wastes from failing septic systems enter surface waters either as direct overland flow or via groundwater. Wet weather events typically increase the rate of transport of pollutant loadings from failing septic systems to surface waters because of the wash-off effect from runoff and the increased rate of groundwater recharge.

Pathogen (MA73-26; MA73-29; MA73-04; MA73-03; MA73-02; MA73-30;)

Total Maximum Daily Load Development

Section 303 (d) of the Federal Clean Water Act (CWA) requires states to place water bodies that do not meet the water quality standards on a list of impaired waterbodies. The CWA requires each state to establish Total Maximum Daily Loads (TMDLs) for listed waters and the pollutant contributing to the impairment(s). TMDLs determine the amount of a pollutant that a waterbody can safely assimilate without violating the water quality standards. Both point and nonpoint pollution sources are accounted for in a TMDL analysis. Point sources of pollution (those discharges from discrete pipes or conveyances) receive a wasteload allocation (WLA) specifying the amount of pollutant each point source can release to the waterbody. Nonpoint sources of pollution (all sources of pollution other than point) receive a load allocation (LA) specifying the amount of a pollutant that can be released to the waterbody by this source. In accordance with the CWA, a TMDL must account for seasonal variations and a margin of safety, which accounts for any lack of knowledge concerning the relationship between effluent limitations and water quality. Thus:

TMDL = WLAs + LAs + Margin of Safety

Where:

WLA = Waste Load Allocation which is the portion of the receiving water's loading capacity that is allocated to each existing and future point source of pollution.

LA = Load Allocation which is the portion of the receiving water's loading capacity that is allocated to each existing and future nonpoint source of pollution.

FECAL COLIFORM TMDL

Loading Capacity. The pollutant loading that a waterbody can safely assimilate is expressed as either mass-per-time, toxicity or some other appropriate measure (40 C.F.R. § 130.2(i)). Typically, TMDLs are expressed as total maximum daily loads. However, MADEP believes it is appropriate to express bacteria TMDLs in terms of concentration because the fecal coliform standard is also expressed in terms of the concentration of organisms per 100 ml. Since source concentrations may not be directly added, the previous equation does not apply. To ensure attainment with Massachusetts' water quality standards for bacteria, all sources (at their point of discharge to the receiving water) must be equal to or less than the standard. Expressing the TMDL in terms of daily loads is difficult to interpret given the very high numbers of bacteria and the magnitude of the allowable load is dependent on flow conditions and, therefore, will vary as flow rates change. For example, a very high number of bacteria are allowable if the volume of water that transports the bacteria is high too. Conversely, a relatively low number of bacteria may exceed water quality standard if flow rates are low. For all the above reasons the TMDL is simply set equal to the standard and may be expressed as follows:

TMDL = Fecal Coliform Standard = WLA(p1) = LA(n1) = WLA(p2) = etc.

Where:

WLA(p1) = allowable concentration for point source category (1)

LA(n1) = allowable concentration for nonpoint source category (1)

WLA(p2) = allowable concentration for point source category (2) etc.

For Class B surface waters the fecal coliform TMDL includes two components: (1) the geometric mean of a representative set of fecal coliform samples shall not exceed 200 organisms per 100 ml; and (2) no more than 10 % of the samples shall exceed 400 organisms per 100 ml. For Class SB surface Waters the fecal coliform TMDL is more restrictive to protect the shellfish use goal and also includes two components: (1) the geometric mean of a representative set of fecal coliform samples shall not exceed 88 organisms per 100 ml; and (2) no more than 10 % of the samples shall exceed 260 organisms per 100 ml.

The goal to attain water quality standards at the point of discharge is environmentally protective, and offers a practical means to identify and evaluate the effectiveness of control measures. In addition, this approach establishes clear objectives that can be easily understood by the public and individuals responsible for monitoring activities. Also, the goal of attaining standards at the point of discharge minimizes human health risks associated with exposure to pathogens because it does not consider losses due to die-off and settling that are known to occur.

Wasteload Allocations (WLAs) and Load Allocations (LAs). Although, there are no permitted discharges of fecal coliform into the Neponset River and its tributaries, direct storm water discharges from numerous storm drainage systems occur. Piped discharges are, by definition, point sources regardless of whether they are currently subject to the requirements of NPDES permits. Therefore, a WLA set equal to the fecal coliform standard will be assigned to the portion of the storm water that discharges to surface waters via storm drains.

WLAs and LAs are identified for all known source categories including both dry and wet weather sources for Class B and SB segments within the Neponset River Basin. Establishing WLAs and LAs that only address dry weather bacteria sources would not ensure attainment of standards because of the significant contribution of wet weather bacteria sources to fecal coliform criteria exceedences. Illicit sewer connections and deteriorating sewers leaking to storm drainage systems represent the primary dry weather point sources of bacteria, while failing septic systems and possibly leaking sewer lines represent the nonpoint sources. Wet weather point sources include discharges from storm water drainage systems, sanitary sewer overflows (SSOs) and, until recently, combined sewer overflows (CSOs). Wet weather nonpoint sources primarily include diffuse storm water runoff.

The following table (originally Table 13 of "Total Maximum Daily Loads of Bacteria for Neponset River Basin" report, 2002) presents the fecal coliform bacteria WLAs and LAs for the various source categories. Source categories representing discharges of untreated sanitary sewage to receiving waters are prohibited, and therefore, assigned WLAs and LAs equal to zero. There are two sets of WLAs and LAs, one for Class B waters and the other for Class SB waters. The WLA and LA for storm water discharging to the lower fresh water portion of the Neponset River (Boston, Milton and Quincy) is set equal to the fecal coliform standard for SB waters in order to ensure that standards for restricted shellfish harvesting are met in the estuary.

Fecal Coliform Waste Load Allocations (WLAs) and Load Allocations (LAs) for the Neponset River and Identified Tributary Streams

Surface Water Classification	Bacteria Source Category	WLA (organisms per 100 ml)	LA (organisms per 100 ml)
B	Illicit Discharges to Storm Drains	0	N/A
B	Leaking Sanitary Sewers	0	0
B	Failing Septic Systems	N/A	0
B	Storm Water Runoff	GM ≤ 200 90% ≤ 400	GM ≤ 200 90% ≤ 400
B	Sanitary Sewer Overflows	0	0
SB	Illicit Discharges to Storm Drains	0	N/A
SB	Failing Septic Systems	N/A	0
SB	Storm Water Runoff (Boston, Milton and Quincy)	GM ≤ 88 90% ≤ 260	GM ≤ 88 90% ≤ 260
SB	Sanitary Sewer Overflows	0	0
SB	Combined Sewer Overflows	0	N/A

GM means geometric mean
N/A means not applicable

The TMDL should provide a discussion of the magnitudes of the pollutant reductions needed to attain the goals of the TMDL. Since accurate estimates of existing sources are generally unavailable, it is difficult to estimate the pollutant reductions for specific sources. For the illicit sources, the goal is complete elimination (100% reduction). However, overall wet weather bacteria load reductions can be estimated using typical storm water bacteria concentrations, and the magnitude of the wet weather data observed in the Neponset Basin. This information indicates that two to three orders of magnitude (99 to 99.9%) reductions in storm water fecal coliform loadings will be necessary, especially in the developed areas draining to small tributaries.

In addition, overall reductions needed to attain water quality standards can be estimated using the extensive ambient fecal coliform data that are available from the Neponset Basin. Using ambient data is beneficial because it provides more realistic estimates of existing conditions and the magnitude of cumulative loading to the surface waters. Reductions are calculated using data from both wet weather conditions and combined wet and dry conditions and are presented in the following table (originally Table 14 of "Total Maximum Daily Loads of Bacteria for Neponset River Basin" report, 2002). Data from 1998 are used since it includes the greatest number of observations at a given location and includes the most wet weather observations. Examining wet weather data separately provides estimates of the magnitude of reductions from all sources during wet weather conditions. As indicated before, bacteria reductions of one to two orders of magnitude are needed to attain water quality standards. For example, when viewing the data in the table below at station MEB001 it would take a 98.9% reduction in fecal coliform during wet weather conditions to meet water quality standards. The 90% observation listed in the table means that 90% of the samples collected at that station fall below the value of 35,000 organisms per 100 ml. That value would have to be reduced to 400 organisms per 100 ml to meet water quality standards criteria (or stated another way a reduction of 98.9 % would be necessary).

Table: Estimates of Fecal Coliform Loading Reductions to the Neponset River and Tributaries			
Station	**MEB001**	**UNB002**	**NER185**
Wet Weather Geo. Mean	9813	2424	1202
% reduction (1)	**98**	**92**	**83**
Overall Geo. Mean	8,400	704	822
% reduction (1)	**98**	**72**	**76**
90 % observation	35,000	3,500	58,000
% reduction (2)	**98.9**	**88.6**	**99.3**

(1) Geometric mean to be less than or equal to 200 organisms per 100 ml.
(2) No more than 10 % of the samples shall exceed 400 organisms per 100 ml.

Margin of Safety: For this analysis, margin of safety is implied. First, the TMDL does not account for mixing in the receiving waters and assumes that zero dilution is available. Realistically, influent water will mix with the receiving water and become diluted provided that the influent water concentration does not exceed the TMDL concentration. Second, the goal of attaining standards at the point of discharge does not account for losses due to die-off and settling that are known to occur.
Seasonal Variability: TMDLs must also account for seasonal variability. This TMDL has set WLAs and LAs for all known and suspected source categories equal to the fecal coliform criteria independent of seasonal conditions. This will ensure the attainment of water quality standards regardless of seasonal and climatic conditions. Any controls that are necessary will be in place throughout the year, and, therefore, will be protective of water quality year round.

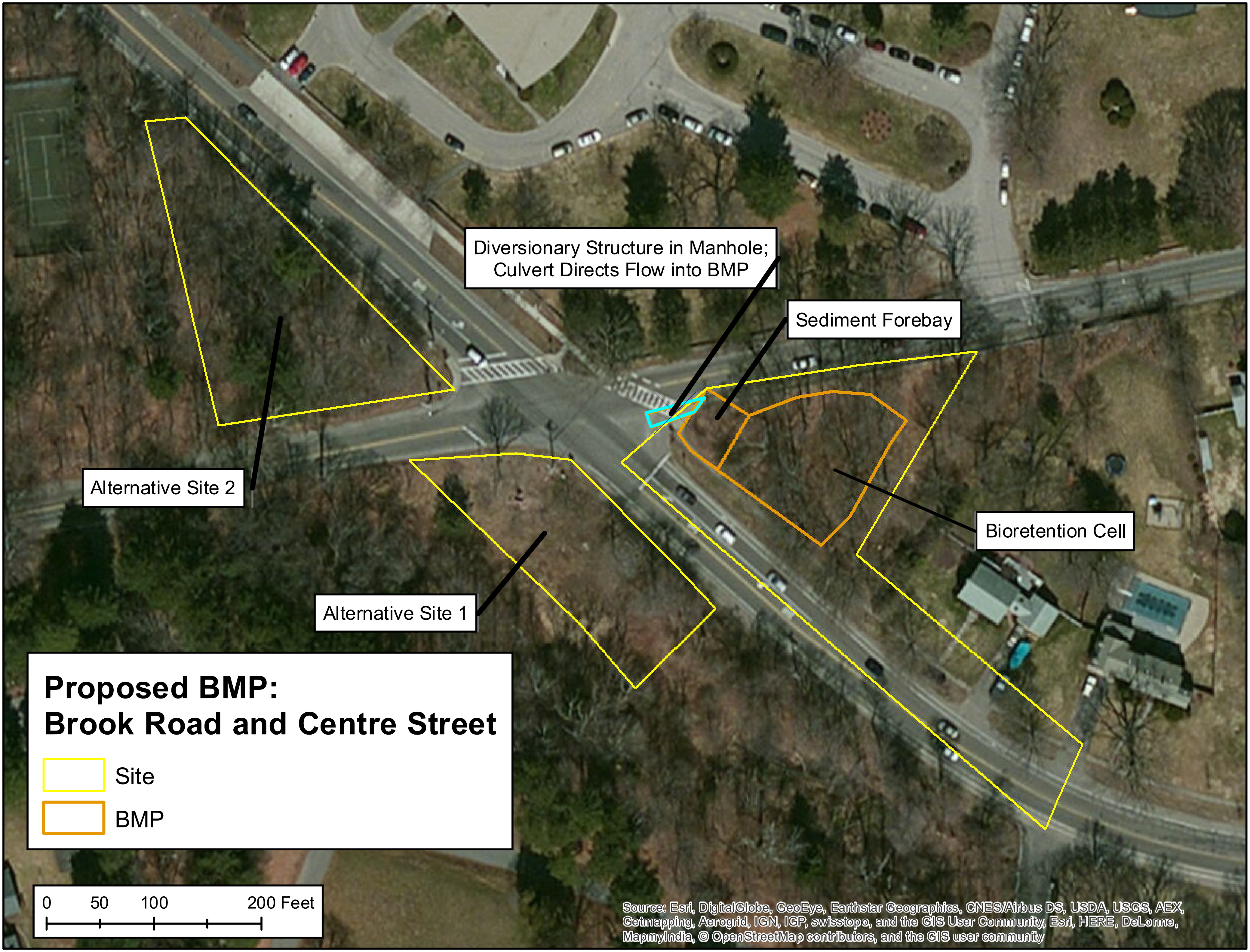
Total Maximum Daily Loads of Bacteria for Neponset River Basin

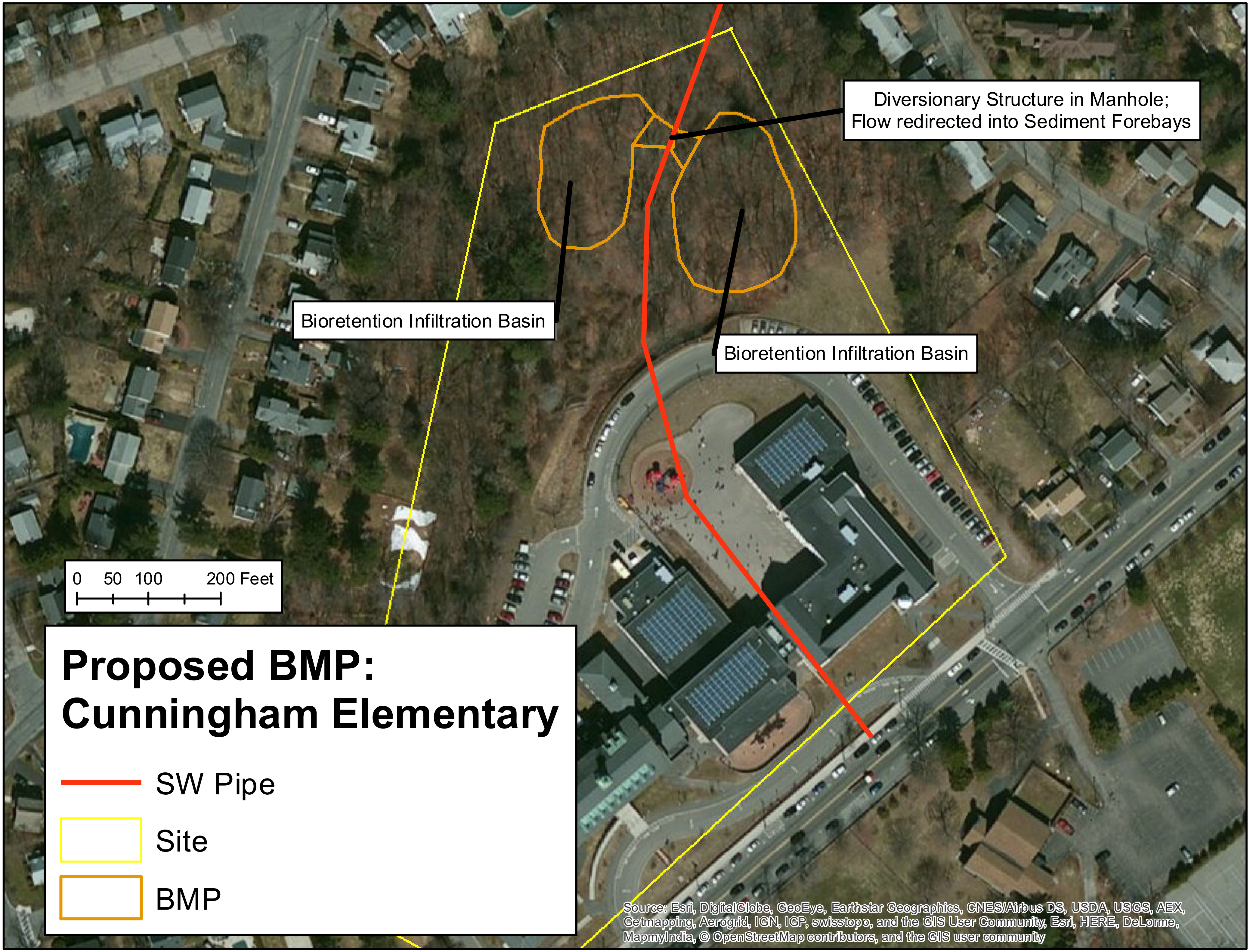
Appendix C – Pollutant Load Export Rates (PLERs)

Land Use & Cover[1]	PLERs (lb/acre/year)		
	(TP)	(TSS)	(TN)
AGRICULTURE, HSG A	0.45	7.14	2.6
AGRICULTURE, HSG B	0.45	29.4	2.6
AGRICULTURE, HSG C	0.45	59.8	2.6
AGRICULTURE, HSG D	0.45	91	2.6
AGRICULTURE, IMPERVIOUS	1.52	650	11.3
COMMERCIAL, HSG A	0.03	7.14	0.3
COMMERCIAL, HSG B	0.12	29.4	1.2
COMMERCIAL, HSG C	0.21	59.8	2.4
COMMERCIAL, HSG D	0.37	91	3.7
COMMERCIAL, IMPERVIOUS	1.78	377	15.1
FOREST, HSG A	0.12	7.14	0.5
FOREST, HSG B	0.12	29.4	0.5
FOREST, HSG C	0.12	59.8	0.5
FOREST, HSG D	0.12	91	0.5
FOREST, HSG IMPERVIOUS	1.52	650	11.3
HIGH DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.3
HIGH DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.2
HIGH DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.4
HIGH DENSITY RESIDENTIAL, HSG D	0.37	91	3.7
HIGH DENSITY RESIDENTIAL, IMPERVIOUS	2.32	439	14.1
HIGHWAY, HSG A	0.03	7.14	0.3
HIGHWAY, HSG B	0.12	29.4	1.2
HIGHWAY, HSG C	0.21	59.8	2.4
HIGHWAY, HSG D	0.37	91	3.7
HIGHWAY, IMPERVIOUS	1.34	1,480	10.5
INDUSTRIAL, HSG A	0.03	7.14	0.3
INDUSTRIAL, HSG B	0.12	29.4	1.2
INDUSTRIAL, HSG C	0.21	59.8	2.4
INDUSTRIAL, HSG D	0.37	91	3.7

INDUSTRIAL, IMPERVIOUS	1.78	377	15.1
LOW DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.3
LOW DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.2
LOW DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.4
LOW DENSITY RESIDENTIAL, HSG D	0.37	91	3.7
LOW DENSITY RESIDENTIAL, IMPERVIOUS	1.52	439	14.1
MEDIUM DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.3
MEDIUM DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.2
MEDIUM DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.4
MEDIUM DENSITY RESIDENTIAL, HSG D	0.37	91	3.7
MEDIUM DENSITY RESIDENTIAL, IMPERVIOUS	1.96	439	14.1
OPEN LAND, HSG A	0.03	7.14	0.3
OPEN LAND, HSG B	0.12	29.4	1.2
OPEN LAND, HSG C	0.21	59.8	2.4
OPEN LAND, HSG D	0.37	91	3.7
OPEN LAND, IMPERVIOUS	1.52	650	11.3
[1]HSG = Hydrologic Soil Group			

Appendix D – Structural BMP Conceptual Designs (NepRWA 2016)


Diversionary Structure in Manhole;
Culvert Directs Flow into BMP
Sediment Forebay
Bioretention Cell
Alternative Site 2
Alternative Site 1
Proposed BMP:
Brook Road and Centre Street
Site
BMP
0 50 100 200 Feet
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community


Proposed BMP: Cunningham Elementary
SW Pipe
Site
BMP
Diversionary Structure in Manhole; Flow redirected into Sediment Forebays
Bioretention Infiltration Basin
Bioretention Infiltration Basin
0 50 100 200 Feet
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community


Sediment Forebay
Diversionary Structure in Manhole; Culvert Directs Flow into BMP
Bioretention Cell With Underdrain
Underdrain Discharges into Unquity Brook
0
50
100
200 Feet
Proposed BMP:
Reservation Road and Centre Street
BMP
Site
Sourc
Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Esri, HERE, DeLorme,
MapmyIndia, © OpenStreetMap contributors, and the GIS user community