Stormwater Management Program (SWMP)

Town of Winchendon

109 Front Street MA 01475

EPA NPDES Permit Number MAR041244

Updated November 2023

This Stormwater Management Plan is based on the EPA's Template and is designed to be updated annually based on the progress of the Town's Stormwater Management Program. Tighe & Bond has added language and information and provided corrected deadlines for requirements where EPA's Template was in error. Page numbers have not been noted in the Table of Contents below because they are anticipated to change annually.

[1] Applicable TMDLs and discharges to water quality limited waters may change as outfalls are located during mapping.

Appendices

J:\W\W1157 Winchendon\074 - Permit Year 3 Stormwater Assistance\Permit Year 3 Annual Report\SWMP Update\SWMP TOC.docx

Town of Winchendon

FY2019-2024 MS4 Permit 6-Year Workplan

A hardcopy version of this Workplan may be retained by the Town and contain the most up-to-date documentation of completed requirements

FY19 **Permit Year 1** **May 2018 - June 2019**	**FY20** **Permit Year 2** **July 2019 - June 2020**	**FY21** **Permit Year 3** **July 2020 - June 2021**	**FY22** **Permit Year 4** **July 2021 - June 2022**	**FY23** **Permit Year 5** **July 2022 - June 2023**	**FY24** **Permit Year 6** **July 2023 - June 2024**

Reporting	**Deadline**	**FY19 Permit Year 1**	**FY20 Permit Year 2**	**FY21 Permit Year 3**	**FY22 Permit Year 4**	**FY23 Permit Year 5**	**FY24 Permit Year 6**
Notice of Intent	Oct. 1, 2018	☑					
Annual Report	Annually by Sept. 28		☑	☑	☑	☑	☐
Prepare Stormwater Management Plan	June 30, 2019 and update annually	☑	☑	☑	☑	☑	☐
MCM 1: Public Education	**Deadline**	**FY19 Permit Year 1**	**FY20 Permit Year 2**	**FY21 Permit Year 3**	**FY22 Permit Year 4**	**FY23 Permit Year 5**	**FY24 Permit Year 6**
Message to residents on stormwater topics of significance.	Distribute one message by June 30, 2023. Target to distribute in PY2 per NOI.		☑				
Message to businesses, institutions and commercial facilities on stormwater topics of significance.	Distribute one message by June 30, 2023. Target to distribute in PY3 per NOI.				☑		
Message to developers and construction companies on stormwater topics of significance, including proper sediment and erosion control management practices.	Distribute one message by June 30, 2023. Target to distribute in PY2 per NOI.		☐				

MCM 1: Public Education (cont.)	Deadline	FY19 Permit Year 1	FY20 Permit Year 2	FY21 Permit Year 3	FY22 Permit Year 4	FY23 Permit Year 5	FY24 Permit Year 6
Message to industrial facilities on stormwater topics of significance, including proper maintenance of parking lot surfaces.	Distribute one message by June 30, 2023. Target to distribute in PY3 per NOI.			☐			
TMDL Requirement: Annual spring message encouraging proper disposal of grass clippings and the use of slow release and phosphorus-free fertilizers.	Starting in Permit Year 3, distribute annually in the spring (April/May)			☑	☑	☑	☐
TMDL Requirement: Annual summer message encouraging proper pet waste management, noting Section 173 of the Town of Winchendon Bylaws.	Starting in Permit Year 3, distribute annually in the summer (June/July)			☑	☑	☑	☐
TMDL Requirement: Annual fall message encouraging proper disposal of leaf litter.	Starting in Permit Year 3, distribute annually in the fall (August/September/ October)			☐	☑	☑	☐
MCM 2: Public Participation	**Deadline**	**FY19 Permit Year 1**	**FY20 Permit Year 2**	**FY21 Permit Year 3**	**FY22 Permit Year 4**	**FY23 Permit Year 5**	**FY24 Permit Year 6**
Comply with State Public Notice Requirements (MGL Ch 30A, Sections 18-25) for all public involvement and participation	Ongoing	☑	☑	☑	☑	☑	☐
Provide public with an opportunity to participate in SWMP review and implementation	Annually by June 30	☑	☑	☑	☑	☑	☐
Make annual reports and SWMP available to the public	Ongoing	☑	☑	☑	☑	☑	☐

Town of Winchendon
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MCM 3: Illicit Discharge Detection and Elimination	Deadline	FY19 Permit Year 1	FY20 Permit Year 2	FY21 Permit Year 3	FY22 Permit Year 4	FY23 Permit Year 5	FY24 Permit Year 6
Adopt bylaw prohibiting illicit discharges and authorizing investigation, repair, and enforcement	June 30, 2021			☑			
Identify all known SSOs that occurred in the last five years	June 30, 2022 and update annually thereafter	✓		✓	☑	☑	☐
Notify EPA / MassDEP of SSO orally within 24 hrs and in writing within 5 days	Ongoing	☑	☑	☑	☑	☑	☐
Notify responsible party immediately upon identification of illicit discharge or illegal connection	Ongoing	☑	☑	☑	☑	☑	☐
Eliminate known illicits or set expeditious schedule in 60 days	Ongoing	☑	☑	☑	☑	☑	☐
Outfall / interconnection inventory and ranking	June 30, 2022 and update annually thereafter				☑	☑	☐
Written IDDE Program document, including statement of responsibilities and written outfall screening and sampling procedure	June 30, 2022				☑		
Written catchment investigation procedure	Dec. 30, 2022					☑	

Town of Winchendon
FY2019-2024 MS4 Permit 6-Year Workplan

MCM 3: Illicit Discharge Detection and Elimination (cont.)	Deadline	FY19 Permit Year 1	FY20 Permit Year 2	FY21 Permit Year 3	FY22 Permit Year 4	FY23 Permit Year 5	FY24 Permit Year 6
Annually train IDDE staff	Annually by June 30 beginning in Permit Year 4	☑	Completed in PY3 due to COVID-19	☑	☐	☑	☐
Complete dry weather outfall and interconnection screening	June 30, 2024						☐
Investigation of problem catchments must begin, including wet weather screening	June 30, 2023					N/A - no problem catchments identified	☐
Finish "Phase I" system mapping requirements - outfalls and receiving waters - open channel conveyances - interconnections with other MS4s - municipally-owned treatment structures - initial catchment delineations	June 30, 2023					☑	
Update system map with available "Phase II" information (see permit for detailed list)	June 30, 2031, Update annually after Phase I mapping is completed						☐

MCM 4: Construction Site Erosion & Sedimentation	Deadline	FY19 Permit Year 1	FY20 Permit Year 2	FY21 Permit Year 3	FY22 Permit Year 4	FY23 Permit Year 5	FY24 Permit Year 6
Bylaw for sediment, erosion, debris, litter and sanitary waste	June 30, 2021			☑			
Written procedure for site plan review/ inspection/ enforcement	June 30, 2021			☑			

MCM 5: New Development and Redevelopment	Deadline	FY19 Permit Year 1	FY20 Permit Year 2	FY21 Permit Year 3	FY22 Permit Year 4	FY23 Permit Year 5	FY24 Permit Year 6
MCM 5 Requirement: Establish a post-construction stormwater bylaw (see permit for detailed list) **TMDL Requirement:** include a requirement that new development and redevelopment BMPs be optimized for nitrogen removal	June 30, 2021			☑			
Report evaluating street design, parking guidelines and related rules	June 30, 2024 and update annually thereafter						☑
Report evaluating allowing green roofs, infiltration, rain harvesting	June 30, 2024						☑
Identify/rank five or more existing permittee-owned sites that could be retrofitted with structural BMPs **TMDL Requirement:** Include consideration of BMPs to reduce nitrogen and phosphorus discharges	June 30, 2024 and update annually thereafter						☐

MCM 6: Good Housekeeping	Deadline	FY19 Permit Year 1	FY20 Permit Year 2	FY21 Permit Year 3	FY22 Permit Year 4	FY23 Permit Year 5	FY24 Permit Year 6
Inventory permittee-owned parks/open space, buildings/facilities and vehicles/equipment	June 30, 2022 and update annually thereafter				☑	☑	☐
Initial catch basin optimization plan	June 30, 2021			☑			

Town of Winchendon
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MCM 6: Good Housekeeping (cont.)	Deadline	FY19 Permit Year 1	FY20 Permit Year 2	FY21 Permit Year 3	FY22 Permit Year 4	FY23 Permit Year 5	FY24 Permit Year 6
Written O&M procedures for parks, buildings, facilities, vehicles and equipment, and infrastructure operations and maintenance (e.g. catch basins, sweeping, and winter road maintenance) **TMDL Requirement:** Include requirements for use of slow-release fertilizers and proper management of grass cuttings and leaf litter	June 30, 2022 and update annually thereafter				☑	☑	☐
Clean catch basins per plan	Annually by June 30 beginning in Permit Year 3			☐	☑	☑	☐
Sweep all curbed roadways at least once annually	Annually by June 30 beginning in Permit Year 3			☑	☑	☑	☐
TMDL Requirement: Sweep streets two times per year, once in the spring and once in the fall. For rural streets with no curbs or catch basins, the Town must sweep at least once per year or develop a targeted inspection and sweeping plan for those streets, per Section 2.3.7.a.iii.3 of the permit.	Annually by June 30 beginning in Permit Year 3			☐	☑	☑	☐
Inspect all municipally owned mapped stormwater treatment structures (excluding catch basins)	Annually by June 30 beginning in Permit Year 5					☐	☐
Implement winter road maintenance program	Annually by June 30 beginning in Permit Year 3			☑	☑	☑	☐

Town of Winchendon
FY2019-2024 MS4 Permit 6-Year Workplan

MCM 6: Good Housekeeping (cont.)	Deadline	FY19 Permit Year 1	FY20 Permit Year 2	FY21 Permit Year 3	FY22 Permit Year 4	FY23 Permit Year 5	FY24 Permit Year 6
Develop and implement a written SWPPP for permittee-owned or operated facilities	Develop by June 30, 2022 and implement continuously thereafter			Determined to be N/A			
Cover or enclose salt piles	June 30, 2022 and implement continuously thereafter				☑	☑	☐
Long Island Sound Nitrogen TMDL	**Deadline**	**FY19 Permit Year 1**	**FY20 Permit Year 2**	**FY21 Permit Year 3**	**FY22 Permit Year 4**	**FY23 Permit Year 5**	**FY24 Permit Year 6**
Complete a Nitrogen Source Identification Report	June 30, 2024						☐
Evaluate all properties identified in the Retrofit Feasibility Assessment and the Nitrogen Source Identification Report that are within the Long Island Sound catchment area, for structural BMP installation. Provide a list of planned structural BMPs and a plan and schedule for implementation in the Permit Year 7 Annual Report.	June 30, 2025						
Track existing or installed structural BMPs in the urbanized area and document the BMP type, total area treated, design storage volume and estimated nitrogen removed by mass.	Sept. 28, 2021 and annually thereafter			Determined to be N/A	Determined to be N/A	☑	☐

Long Island Sound Nitrogen TMDL (cont.)	Deadline	FY19 Permit Year 1	FY20 Permit Year 2	FY21 Permit Year 3	FY22 Permit Year 4	FY23 Permit Year 5	FY24 Permit Year 6
Plan and install a minimum of one structural BMP as a demonstration project within the drainage area of the Long Island Sound or its tributaries. The demonstration project shall target a catchment with high nitrogen load potential.	June 30, 2026						

Millers Basin Lakes Phosphorus TMDL	Deadline	FY19 Permit Year 1	FY20 Permit Year 2	FY21 Permit Year 3	FY22 Permit Year 4	FY23 Permit Year 5	FY24 Permit Year 6
Complete Lake Phosphorus Control Plan (LPCP) Legal Analysis	June 30, 2022				☑		
Complete LPCP funding source assessment	June 30, 2023					☑	
Define LPCP area and scope	June 30, 2024						☑
Calculate baseline phosphorus, allowable phosphorus load, and phosphorus reduction requirements	June 30, 2024						☑
Complete all remaining elements of the written LPCP plan (see permit for detailed list)	June 30, 2025						

This Workplan was prepared by Tighe & Bond to facilitate completion of EPA Phase II Small MS4 General Permit requirements. This document is not intended to replace the MS4 General Permit, and requirements of the General Permit shall prevail.

Checklist of Key Documentation

Documentation of BMP progress should be kept in Appendix H. The following checklist includes the required documentation for MCMs 1-6, Impaired Waters and TMDLs.

MCM 1 – Public Education and Outreach

- ☐ All educational materials provided to target audiences;
- ☐ Distribution lists for target audiences;
- ☐ Dates of distribution of educational materials; and
- ☐ Note educational goals and opinion on effectiveness based on results tracked; modify education and outreach program if necessary.

MCM 2 – Public Involvement and Participation

- ☐ Dates of public meetings when a stormwater management-related topic is discussed; and
- ☐ Dates of public participation activities and quantification of participation (such as number of volunteers/participants, number of bags collected, etc.).

MCM 3 – Illicit Discharge Detection and Elimination (IDDE) Program

- ☐ Log of phone calls and complaints received regarding suspected illicit connections and other storm drain issues, including dates and actions taken;
- ☐ SSO inventory (updated annually), including the number of SSOs, illicit discharges, and illicit connections identified and/or removed and the volume of sewage removed;
- ☐ Drainage system map;
- ☐ Data collected during dry and wet weather outfall/interconnection investigations, including the date, outfall/interconnection identifier, location, weather conditions at time of sampling, precipitation in previous 48 hours, field screening results, and results of all analyses (summarize on an annual basis and for the entire permit term);
- ☐ Number and percent of total outfall catchments served by the MS4 evaluated using the catchment investigation procedure;
- ☐ Presence or absence of System Vulnerability Factors for each catchment;
- ☐ Data collected during key junction manhole investigations;
- ☐ Inspection and maintenance records; and
- ☐ Frequency and type of employee training, including employees trained, training topic, date/time, and materials presented.

MCM 4 – Construction Site Stormwater Runoff Control

- ☐ Number of site reviews, inspections, and enforcement actions; and
- ☐ Modifications to Winchendon’s ordinances, regulations, policies, and/or procedures as necessary.

MCM 5 – Post Construction Stormwater Management in New Development and Redevelopment

- ☐ Measures the Town has taken to ensure adequate long-term operation and maintenance of stormwater BMPs and to require submission of as-built plans;
- ☐ Modifications to Winchendon's ordinances, regulations, policies, and/or procedures as necessary;
- ☐ Status of street and parking lot guidelines assessment. including any planned or completed changes to local regulations and guidelines
- ☐ Status of green infrastructure assessment, including findings and progress towards making green infrastructure allowable; and
- ☐ Retrofit inventory, including all sites that have been modified or retrofitted. Sites should include Town-owned sites identified in the inventory as well as non-municipal property modified or retrofitted to mitigate impervious area.

MCM 6 – Good Housekeeping and Pollution Prevention for Permittee Owned Operations

- ☐ Inventory of municipal facilities and equipment;
- ☐ Plan for optimizing catch basin cleaning and metrics about the number of catch basins, quantity cleaned and inspected, and total volume of material removed from all catch basins;
- ☐ Miles of streets cleaned and the volume of material removed; and
- ☐ All records associated with SWPPP quarterly site inspections, maintenance activities, and training.

Impaired Waters and TMDLs

Lake and Pond Phosphorus TMDL *– Millers Basin Lakes: Lake Denison, Stoddard Pond, Whitney Pond, and Whites Mill Pond*

- ☐ Progress report on the planning and implementation of the Lake Phosphorus Control Plan;

Beginning in the **Year 7 Annual Report**, the Town shall include:

- ☐ All non-structural control measures implemented and the corresponding phosphorus reduction in mass/year;
- ☐ The location, corresponding phosphorus reduction and date of last completed maintenance for all structural controls implemented during the reporting year and all previous years;
- ☐ Phosphorus load increase due to development over the previous reporting period and to date; and
- ☐ Estimated yearly phosphorus export rate (calculated following the procedure in Appendix H Part II.2.d).

Impaired Waters and TMDLs, continued

Long Island Sound Nitrogen TMDL

- ☐ All educational materials provided to target audiences;
- ☐ Distribution lists for target audiences;
- ☐ Dates of distribution of educational materials;
- ☐ Modifications to Winchendon's bylaws, regulations, policies, and/or procedures as necessary;
- ☐ Plan for proper management of grass cuttings and leaf litter;
- ☐ Requirements for use of slow-release fertilizers on Town-owned properties currently using fertilizer;
- ☐ Miles of streets cleaned and the volume of material removed – increase sweeping to twice per year in the Long Island Sound watershed;
- ☐ Track existing or installed structural BMPs in the urbanized area and document the BMP type, total area treated, design storage volume and estimated nitrogen removed by mass;
- ☐ All screening and monitoring results targeting the Long Island Sound or its tributaries;

Beginning in the **Year 7 Annual Report**, the Town shall include:

- ☐ List of planned structural BMPs and a schedule for implementation.

Certification

Authorized Representative (Optional): All reports, including SWPPPs, inspection reports, annual reports, monitoring reports, reports on training and other information required by this permit must be signed by a person described in Appendix B, Subsection 11.A or by a duly authorized representative of that person in accordance with Appendix B, Subsection 11.B. If there is an authorized representative to sign MS4 reports, there must be a signed and dated written authorization.
The authorization letter is:

☐ Attached to this document (document name listed below)

Not applicable

☐ Publicly available at the website below

Not applicable

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Printed Name Justin Sultzbach

Signature

Date 12·28·21

Click Here for Revisions

Background

Stormwater Regulation

The Stormwater Phase II Final Rule was promulgated in 1999 and was the next step after the 1987 Phase I Rule in EPA's effort to preserve, protect, and improve the Nation's water resources from polluted stormwater runoff. The Phase II program expands the Phase I program by requiring additional operators of MS4s in urbanized areas and operators of small construction sites, through the use of NPDES permits, to implement programs and practices to control polluted stormwater runoff. Phase II is intended to further reduce adverse impacts to water quality and aquatic habitat by instituting the use of controls on the unregulated sources of stormwater discharges that have the greatest likelihood of causing continued environmental degradation. Under the Phase II rule all MS4s with stormwater discharges from Census designated Urbanized Area are required to seek NPDES permit coverage for those stormwater discharges.

Permit Program Background

On May 1, 2003, EPA Region 1 issued its Final General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (2003 small MS4 permit) consistent with the Phase II rule. The 2003 small MS4 permit covered "traditional" (i.e., cities and towns) and "non-traditional" (i.e., Federal and state agencies) MS4 Operators located in the states of Massachusetts and New Hampshire. This permit expired on May 1, 2008 but remained in effect until operators were authorized under the 2016 MS4 general permit, which became effective on July 1, 2018.

Stormwater Management Program (SWMP)

The SWMP describes and details the activities and measures that will be implemented to meet the terms and conditions of the permit. The SWMP accurately describes the permittees plans and activities. The document should be updated and/or modified during the permit term as the permittee's activities are modified, changed or updated to meet permit conditions during the permit term. The main elements of the stormwater management program are (1) a public education program in order to affect public behavior causing stormwater pollution, (2) an opportunity for the public to participate and provide comments on the stormwater program (3) a program to effectively find and eliminate illicit discharges within the MS4 (4) a program to effectively control construction site stormwater discharges to the MS4 (5) a program to ensure that stormwater from development projects entering the MS4 is adequately controlled by the construction of stormwater controls, and (6) a good housekeeping program to ensure that stormwater pollution sources on municipal properties and from municipal operations are minimized.

Town Specific MS4 Background (optional)

Attached in Appendix A.

Small MS4 Authorization

The NOI was submitted on Sep 28, 2018

The NOI can be found at the following (document name or web address):

https://www3.epa.gov/region1/npdes/stormwater/ma/tms4noi/winchendon.pdf AND Attached in Appendix B.

Authorization to Discharge was granted on Apr 5, 2019

The Authorization Letter can be found (document name or web address):

https://www3.epa.gov/region1/npdes/stormwater/ma/tms4noi/winchendon-auth.pdf AND Attached in Appendix B.

Stormwater Management Program Team

SWMP Team Coordinator

Name	Brian Croteau	Title	DPW Director
Department	Department of Public Works		
Phone Number	978-297-5411	Email	bcroteau@townofwinchendon.com
Responsibilities	Manage the Town of Winchendon's Stormwater Management Program and compliance with the MS4 Permit, and oversee the DPW's Stormwater Operations, including public education and outreach, the IDDE program and Good Housekeeping Program.		

SWMP Team

Name	Tracy Murphy	Title	Director of Planning and Development
Department	Department of Planning & Development		
Phone Number	978-297-5414	Email	tmurphy@townofwinchendon.com
Responsibilities	Assist the DPW in public education and outreach to developers and in mapping the storm sewer system, work with the Conservation Commission, Building Department and Zoning Board to develop construction and post-construction bylaws and site inspection policies and procedures, and assess street and parking lot guidelines and regulations for green infrastructure.		

Name	TBD	Title	Planning/Conservation Agent
Department	Planning Board/Zoning/Conservation Commission		
Phone Number	978-297-3537	Email	TBD
Responsibilities	Assist the DPW in public education and outreach to developers, and work with the Planning Department, Building Department, and Zoning Board to develop construction and post-construction bylaws and site inspection policies and procedures.		

Name	James Abare, R.S.	Title	Health Agent
Department	Board of Health		
Phone Number	978-297-3537	Email	jabare@townofwinchendon.com

Responsibilities	Assist the DPW in developing and enforcing the IDDE Bylaw.

Name	Geoff Newton	Title	Building Commissioner
Department	Building Department		
Phone Number	978-297-5401	Email	gnewton@townofwinchendon.com
Responsibilities	Work with the Conservation Commission, Planning Department and Zoning Board to develop construction bylaws and site inspection policies and procedures.		

Name	James Murphy	Title	Director of Facilities
Department	School Department		
Phone Number	978-297-0031	Email	jmurphy@winchendononk12.org
Responsibilities	Assist the DPW in developing an inventory and O&M procedures for school facilities.		

Name		Title	
Department			
Phone Number		Email	
Responsibilities			

Add SWMP Member

Receiving Waters

The following table lists all receiving waters, impairments and number of outfalls discharging to each waterbody segment.

OR

The information can be found in the following document or at the following web address:

Table of Receiving Waters included in NOI and Attached in Appendix B.

Waterbody segment that receives flow from the MS4	Number of outfalls into receiving water segment	Chloride	Chlorophyll-a	Dissolved Oxygen/ DO Saturation	Nitrogen	Oil & Grease/ PAH	Phosphorus	Solids/ TSS/ Turbidity	E. coli	Enterococcus	Other pollutant(s) causing impairments
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Click here to lengthen table

Eligibility: Endangered Species and Historic Properties

*Reminder: The proper consultations and updates to the SWMP must be conducted for construction projects related to your permit compliance where Construction General Permit (CGP) coverage, which requires its own endangered species and history preservation determination, is NOT being obtained.

Attachments:

- ☒ The results of Appendix C U.S. Fish and Wildlife Service endangered species screening determination
- ☒ The results of the Appendix D historic property screening investigations
- ☐ If applicable, any documents from the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (THPO), or other Tribal representative to mitigate effects

These attachments are required within one year of the permit effective date and are:

- ☒ Attached to this document (document names listed below)

  Endangered Species Act Eligibility Certification attached in Appendix C and National Historic Preservation Act Certification attached in Appendix D.

- ☐ Publicly available at the website listed below

Under what criterion did permittee determine eligibility for ESA?

☐ Criterion A ☐ Criterion B ☒ Criterion C

Under what criterion did permittee determine eligibility for Historic Properties?

☒ Criterion A ☐ Criterion B ☐ Criterion C

Below add any additional measures for structural controls that you're required to do through consultation with U.S. Fish and Wildlife Service (if applicable):

Not applicable.

Below add any additional measures taken to avoid or minimize adverse impacts on places listed, or eligible for listing, on the NRHP, including any conditions imposed by the SHPO or THPO (if applicable):

Not applicable.

MCM 1

Public Education and Outreach

Permit Part 2.3.2

Objective: The permittee shall implement an education program that includes educational goals based on stormwater issues of significance within the MS4 area. The ultimate objective of a public education program is to increase knowledge and change behavior of the public so that the pollutants in stormwater are reduced.

Examples and Templates:
EPA's Stormwater Education Toolbox
MassDEP's Stormwater Outreach Materials

Other templates relevant to MCM 1 can be found here: https://www.epa.gov/npdes-permits/stormwater-tools-new-england#peo

BMP: Multi-media Public Education and Outreach

BMP Number (Optional) **1A**

Document Name and/or Web Address: To be included in Appendix H when complete.

Description:

Education and outreach on stormwater management using multi media methods, including web and printed materials. Distribute seasonal messages to residents related to impaired waterbodies in the spring, summer and fall. Annual spring messages will encourage proper disposal of grass clippings and the use of slow release and phosphorus-free fertilizers. Annual summer messages will encourage proper pet waste management, noting Section 173 of the Town of Winchendon Bylaws. Annual fall messages will encourage proper disposal of leaf litter. The Town will also provide information to owners of septic systems about proper maintenance in any catchment that discharges to a waterbody impaired for bacteria or pathogens (i.e., Millers River Segment MA35-01, Otter River). This BMP will be coordinated with requirements for TMDLs and Water Quality Limited Waters.

Targeted Audience: Residents

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

Distribute a minimum of one educational message over the permit term to residents on stormwater management topics of significance in Winchendon. Beginning in Permit Year 3, supplement this message with three educational messages per year in the spring, summer and fall as outlined in Appendices F and H of the General Permit. The Town may also wish to measure results in more specific ways like the percent of residents reached or changes in behaviors impacting stormwater management.

Message Date(s): 2019 (PY2), 2020 (PY3), 2021 (PY4), 2022 (PY5)

BMP: Multi-media Public Education and Outreach

BMP Number (Optional) **1B**

Document Name and/or Web Address: To be included in Appendix H when complete.

Description:

Education and outreach on stormwater management using multi media methods, including web and printed materials. Distribute seasonal messages to businesses, institutions and commercial facilities related to impaired waterbodies in the spring, summer and fall. Annual spring messages will encourage proper disposal of grass clippings and the use of slow release and phosphorus-free fertilizers. Annual summer messages will encourage proper pet waste management, noting Section 173 of the Town of Winchendon Bylaws. Annual fall messages will encourage proper disposal of leaf litter. The Town will also provide information to owners of septic systems about proper maintenance in any catchment that discharges to a waterbody impaired for bacteria or pathogens (i.e., Millers River Segment MA35-01, Otter River). This BMP will be coordinated with requirements for TMDLs and Water Quality Limited Waters.

Targeted Audience: Businesses, institutions and commercial facilities

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

Distribute a minimum of one educational message over the permit term to businesses, institutions and commercial facilities on stormwater management topics of significance in Winchendon. Beginning in Permit Year 3, supplement this message with three educational messages per year in the spring, summer and fall as outlined in Appendices F and H of the General Permit. The Town may also wish to measure results in more specific ways like the percent of businesses, institutions and commercial facilities reached or changes in behaviors impacting stormwater management.

Message Date(s): 2019 (PY2), 2020 (PY3), 2021 (PY4), 2022 (PY5)

BMP: Multi-media Public Education and Outreach

BMP Number (Optional) **1C**

Document Name and/or Web Address: To be included in Appendix H when complete.

Description:

Education and outreach to developers on stormwater management using multi media methods, including web and printed materials.

Targeted Audience: Developers (construction)

Responsible Department/Parties: Planning Department/Conservation Commission

Measurable Goal(s):

Distribute a minimum of one (1) educational message over the permit term to developers. The Town may also wish to measure results in more specific ways like the percent of developers reached or changes in behaviors impacting stormwater management.

Message Date(s): 2019 (PY2)

BMP: Multi-media Public Education Outreach

BMP Number (Optional) **1D**

Document Name and/or Web Address: To be included in Appendix H when complete.

Description:

Education and outreach to industrial facilities on stormwater management using multi media methods, including web and printed materials.

Targeted Audience: Industrial facilities

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

Distribute a minimum of one (1) educational message over the permit term to industrial facilities. The Town may also wish to measure results in more specific ways like the percent of industrial facilities reached or changes in behaviors impacting stormwater management.

Message Date(s): 2020 (PY3)

BMP: N/A

BMP Number (Optional) ________

Document Name and/or Web Address:

Description:

N/A

Targeted Audience:

Responsible Department/Parties:

Measurable Goal(s):

Message Date(s):

BMP: N/A

BMP Number (Optional) ________

Document Name and/or Web Address:

Description:

N/A

Targeted Audience:

Responsible Department/Parties:

Measurable Goal(s):

Message Date(s):

BMP: N/A

BMP Number (Optional) ________

Document Name and/or Web Address:

Description:

N/A

Targeted Audience:

Responsible Department/Parties:

Measurable Goal(s):

Message Date(s):

BMP: N/A

BMP Number (Optional) ________

Document Name and/or Web Address:

Description:

N/A

Targeted Audience:

Responsible Department/Parties:

Measurable Goal(s):

Message Date(s):

Add BMP

MCM 2

Public Involvement and Participation

Permit Part 2.3.3

Objective: The permittee shall provide opportunities to engage the public to participate in the review and implementation of the permittee's SWMP.

BMP: Public Review of Stormwater Management Program

BMP Number (Optional) **2A**

Location of Plan and/or Web Address: Available at the Department of Public Works and online at: https://www.townofwinchendon.com/public-works

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

Annually provide the public with an opportunity to participate in the review and implementation of the SWMP.

BMP: Public Participation in Stormwater Management Program Development

BMP Number (Optional) **2B**

Description:

Provide opportunities for public involvement and participation in Winchendon's stormwater program.

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

Ongoing compliance. Report events and activities organized for public participation in Annual Reports.

BMP: N/A

BMP Number (Optional)

Document Name and/or Web Address:

Description:

N/A

Responsible Department/Parties:

Measurable Goal(s):

Add BMP

MCM 3

Illicit Discharge Detection and Elimination (IDDE) Program

Permit Part 2.3.4

Objective: The permittee shall implement an IDDE program to systematically find and eliminate illicit sources of non-stormwater discharges to its municipal separate storm sewer system and implement procedures to prevent such discharges.

Examples and Templates: IDDE Program Template and SOPs Other templates relevant to IDDE can be found here: https://www.epa.gov/npdes-permits/stormwater-tools-new-england#idde

BMP: IDDE Legal Authority

BMP Number (Optional) **3A** **Completed** (by year 3) ☒

Ordinances Link or Reference: Article 31 of the Town's General Bylaws: Stormwater Management Bylaw

Department Responsible for Enforcement: Planning Board

BMP: Sanitary Sewer Overflow (SSO) Inventory

BMP Number (Optional) **3B** **Completed** (by year 4) ☒

Document Name and/or Web Address: SSO Inventory is included in Appendix E.

Description:

Annually track and report the following SSO information: the location; a clear statement of whether the discharge entered a surface water directly or entered the MS4; date(s) and time(s) of each known SSO occurrence; estimated volume(s) of the occurrence; description of the occurrence indicating known or suspected cause(s); mitigation and corrective measures completed with dates implemented; and mitigation and corrective measures planned with implementation schedules.

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

Develop SSO inventory by June 30, 2022. Track number of SSOs identified and removed annually thereafter and update in Annual Reports.

SSO Reporting:

In the event of an overflow or bypass, a notification must be reported within 24 hours by phone to MassDEP, EPA, and other relevant parties. Follow up the verbal notification with a written report following MassDEP's Sanitary Sewer Overflow (SSO)/Bypass notification form within 5 calendar days of the time you become aware of the overflow, bypass, or backup.

The MassDEP contacts are: Northeast Region (978) 694-3215 205B Lowell Street Wilmington, MA 01887 Central Region (508) 792-7650 8 New Bond Street Worcester, MA 01606 Southeast Region (508) 946-2750 20 Riverside Drive Lakeville, MA 02347 Western Region (413) 784-1100 436 Dwight Street Springfield, MA 01103 24-hour Emergency Line 1-888-304-1133	The EPA contacts are: EPA New England (617) 918-1510 5 Post Office Square Boston, MA 02109

BMP: Map of Storm Sewer System

BMP Number (Optional) **3C** | **Phase I Completed** (by year 5) ☒ | **Phase II Completed** (by year 13) ☐

Document Location and/or Web Address: Location to be updated when mapping is complete.

Description:

Create a map of the storm sewer system and update during IDDE program implementation.

Responsible Department/Parties: Department of Public Works/Planning Department

Measurable Goal(s):

By June 30, 2023, complete Phase I mapping: include 100% of outfalls and receiving waters; open channel conveyances; interconnections with other MS4s and other storm sewer systems, municipally-owned stormwater treatment structures; waterbodies identified by name and indication of all use impairments; and initial catchment delineations. By June 30, 2031, complete Phase II mapping: map 100% of outfall spatial locations; pipes, manholes; catch basins; refined catchment delineations; and municipal sanitary sewer system.

BMP: IDDE Program

BMP Number (Optional) **3D/3E1-3** | **Written Document Completed** (by year 4) ☒

Document Name and/or Web Address: Illicit Discharge Detection and Elimination Program, Aug 2019

Description:

Create written IDDE program. Complete outfall/interconnection inventory and initial ranking, dry weather outfall screening and sampling, and catchment investigations.

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

By June 30, 2022, develop written IDDE program and complete outfall/interconnection and initial ranking. Update the written IDDE program annually thereafter, and update the inventory and ranking as necessary. By June 30, 2022, complete the outfall and interconnection inventory and initial ranking. By June 30, 2024, complete dry weather outfall screening and sampling for all outfalls. By June 30, 2031, complete 100% of all catchment investigations. Track number of illicit discharges identified and volume removed. This BMP will be coordinated with requirements for TMDLs and Water Quality Limited Waters.

The outfall/interconnection inventory and initial ranking and the dry weather outfall and interconnection screening and sampling results can be found:

To be updated when outfall/interconnection inventory, ranking and dry weather inspections are complete.

BMP: Employee Training

BMP Number (Optional) **3F**

Description:

Train employees on IDDE implementation.

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

Training will occur annually beginning in Permit Year 4. Track employees trained, training topics, date/time and materials presented.

BMP: N/A

BMP Number (Optional)

Completed ☐

Document Name and/or Web Address:

Description:

N/A

Responsible Department/Parties:

Measurable Goal(s):

Add BMP

MCM 4

Construction Site Stormwater Runoff Control

Permit Part 2.3.5

Objective: The objective of an effective construction stormwater runoff control program is to minimize or eliminate erosion and maintain sediment on site so that it is not transported in stormwater and allowed to discharge to a water of the U.S. through the permittee's MS4.

Examples and Templates:
Examples and templates relevant to MCM 4, including model ordinances and site inspection templates, can be found here: https://www.epa.gov/npdes-permits/stormwater-tools-new-england#csrc

BMP: Sediment and Erosion Control Ordinance

BMP Number (Optional) **4A** — **Completed** (by year 3) ☒

Ordinances Link or Reference: Article 31 of the Town's General Bylaws: Stormwater Management Bylaw and associated Regulations

Department Responsible for Enforcement: Planning Board

BMP: Site Plan Review Procedures

BMP Number (Optional) **4B** — **Written procedures completed** (by year 3) ☒

Document Name and/or Web Address: Article 31 of the Town's General Bylaws: Stormwater Management Bylaw and associated Regulations

Description:

Develop and implement written procedures for site plan review per Part 2.3.5 of the General Permit.

Responsible Department/Parties: Planning Department/Conservation Commission/Building Inspector/Zoning

Measurable Goal(s):

Review current procedures and, if necessary, modify by June 30, 2021.

BMP: Site Inspections and Enforcement of Sediment and Erosion Control Measures Procedures

BMP Number (Optional) **4B** — **Completed** (by year 3) ☒

Document Name and/or Web Address: Article 31 of the Town's General Bylaws: Stormwater Management Bylaw and associated Regulations

Description:

Develop and implement written procedures for site inspections and enforcement procedures per Part 2.3.5 of the General Permit.

Responsible Department/Parties: Planning Department/Conservation Commission/Building Inspector/Zoning

Measurable Goal(s):

Review current procedures and, if necessary, modify by June 30, 2021.

BMP: N/A

BMP Number (Optional) ________ **Completed** ☐

Document Name and/or Web Address:

Description:

N/A

Responsible Department/Parties:

Measurable Goal(s):

Add BMP

MCM 5

Post Construction Stormwater Management in New Development and Redevelopment

Permit Part 2.3.6

Objective: The objective of an effective post construction stormwater management program is to reduce the discharge of pollutants found in stormwater to the MS4 through the retention or treatment of stormwater after construction on new or redeveloped sites and to ensure proper maintenance of installed stormwater controls.

Examples and Templates:
Examples and templates relevant to MCM 5, including model ordinances and bylaw review templates and guidance can be found here: https://www.epa.gov/npdes-permits/stormwater-tools-new-england#pcsm

BMP: Post-Construction Ordinance

BMP Number (Optional) **5A** **Completed** (by year 3) ☒

Town Ordinances Link or Reference: Article 31 of the Town's General Bylaws: Stormwater Management Bylaw and associated Regulations

Department Responsible for Enforcement: Planning Board

BMP: Street Design and Parking Lot Guidelines Report

BMP Number (Optional) **5B** **Completed** (by year 6) ☒

Document Name and/or Web Address: To be updated when Street Design and Parking Lot Guidelines Report is complete.

Description:

By June 30, 2024, develop a report assessing requirements that affect the creation of impervious cover. The assessment will help determine if change to design standards for streets and parking lots can be modified to support low impact design options.

Responsible Department/Parties: Department of Planning and Development

Measurable Goal(s):

Complete report no later than six (6) years of permit effective date.

BMP: Green Infrastructure Report

BMP Number (Optional) **5C** **Completed** (by year 6) ☒

Document Name and/or Web Address: To be updated when Green Infrastructure Report is complete.

Description:

By June 30, 2024, develop a report assessing existing local regulations to determine the feasibility of making green infrastructure practices allowable when appropriate site conditions exist.

Responsible Department/Parties: Department of Planning and Development

Measurable Goal(s):

Complete report no later than six (6) years of permit effective date.

BMP: List of Municipal Retrofit Opportunities

BMP Number (Optional) **5D**

Completed (by year 6) ☐

Document Name and/or Web Address: To be updated when Retrofit Feasibility Assessment is complete.

Description:

By June 30, 2024, conduct detailed inventory of Town-owned properties and rank for retrofit potential. At a minimum, the Town shall consider municipal properties with significant impervious cover that could be modified or retrofitted to reduce the frequency, volume or pollutant loads of stormwater discharges. This BMP will be coordinated with requirements for TMDLs and Water Quality Limited Waters.

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

Complete report no later than six (6) years of permit effective date, beginning in Permit Year 7 keep a running list of at least five (5) retrofit sites.

BMP: N/A

BMP Number (Optional)

Completed ☐

Document Name and/or Web Address:

Description:

N/A

Responsible Department/Parties:

Measurable Goal(s):

Add BMP

MCM 6

Good Housekeeping and Pollution Prevention for Permittee Owned Operations

Permit Part 2.3.7

Objective: The permittee shall implement an operations and maintenance program for permittee-owned operations that has a goal of preventing or reducing pollutant runoff and protecting water quality from all permittee-owned operations.

Examples and Templates:
Examples and templates relevant to MCM 6, including SOP templates for catch basin cleaning, street sweeping, vehicle maintenance, parks and open space management, winter deicing, and Stormwater Pollutoin Prevention Plans can be found here: https://www.epa.gov/npdes-permits/stormwater-tools-new-england#gh

PERMITTEE OWNED FACILITIES

BMP: Parks and Open Spaces Operations and Maintenance Procedures

BMP Number (Optional) **6A** **Written Document Completed** (by year 4) ☒

Document Name and/or Web Address: Good Housekeeping and Pollution Prevention Program for Municipal Operations and Maintenance, July 2021

Description:

By June 30, 2022, inventory and create O&M procedures for all Town-owned parks and open spaces within the urbanized area. This BMP will be coordinated with requirements for TMDLs and Water Quality Limited Waters.

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

Complete inventory and written Operations & Maintenance procedures for Town-owned parks and open spaces within the urbanized area and implement Operations and Maintenance Program.

Properties List (Optional)**:**

BMP: Buildings and Facilities Operations and Maintenance Procedures

BMP Number (Optional) **6A** **Written Document Completed** (by year 4) ☒

Document Name and/or Web Address: Good Housekeeping and Pollution Prevention Program for Municipal Operations and Maintenance, July 2021

Description:

By June 30, 2022, inventory and create O&M procedures for all Town-owned buildings and facilities (including their storm drains) within the urbanized area.

Responsible Department/Parties: Department of Public Works/School Department

Measurable Goal(s):

Complete inventory and written Operations & Maintenance procedures for Town-owned buildings and facilities within the urbanized area and implement Operations and Maintenance Program.

Properties List (Optional)**:**

BMP: Vehicles and Equipment Operations and Maintenance Procedures

BMP Number (Optional) **6A** **Written Document Completed** (by year 4) ☒

Document Name and/or Web Address: Good Housekeeping and Pollution Prevention Program for Municipal Operations and Maintenance, July 2021

Description:

By June 30, 2022, inventory and create O&M procedures for all Town-owned vehicles and equipment stored within the urbanized area.

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

Complete inventory and written Operations & Maintenance procedures for Town-owned vehicles and equipment stored within the urbanized area and implement Operations and Maintenance Program.

Properties List (Optional)**:**

INFRASTRUCTURE

BMP: Infrastructure Operations and Maintenance Procedures

BMP Number (Optional) **6B** **Written Procedure Completed** (by year 4) ☒

Document Name and/or Web Address: Good Housekeeping and Pollution Prevention Program for Municipal Operations and Maintenance, July 2021

Description:

By June 30, 2022, establish and implement a program for repair and rehabilitation of MS4 infrastructure within the urbanized area. This BMP will be coordinated with requirements for TMDLs and Water Quality Limited Waters.

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

Establish and implement repair and rehabilitation program.

BMP: Catch Basin Cleaning Program

BMP Number (Optional) **6D-1** **Written Procedure Completed** (by year 4) ☒

Document Name and/or Web Address: Good Housekeeping and Pollution Prevention Program for Municipal Operations and Maintenance, July 2021

Description:

By June 30, 2022, implement procedures developed under BMP 6B to optimize catch basin cleaning within the urbanized area. This BMP will be coordinated with requirements for TMDLs and Water Quality Limited Waters.

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

Track frequency and material quantity of catch basin cleaning. Document plan for optimizing catch basin cleaning in Permit Year 4 Annual Report.

BMP: Street Sweeping Program

BMP Number (Optional) **6D-2** **Written Procedure Completed** (by year 4) ☒

Document Name and/or Web Address: Good Housekeeping and Pollution Prevention Program for Municipal Operations and Maintenance, July 2021

Description:

By June 30, 2022, implement procedures for street and parking lot sweeping developed under BMP 6B. Per the requirements for TMDLs and Water Quality Limited Waters, Winchendon will conduct street and parking lot sweeping within the urbanized area (See Appendix A) twice per year at a minimum, once in the spring and once in the fall. For rural streets with no curbs or catch basins, the Town must sweep at least once per year or develop a targeted inspection and sweeping plan for those streets, per Section 2.3.7.a.iii.3 of the permit.

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

Annually track number of miles cleaned or the volume or mass of material removed beginning in Permit Year 4.

BMP: Winter Road Maintenance Program

BMP Number (Optional) **6D-3** **Written Procedure Completed** (by year 4) ☒

Document Name and/or Web Address: Good Housekeeping and Pollution Prevention Program for Municipal Operations and Maintenance, July 2021

Description:

By June 30, 2022, implement procedures for use and storage of deicing materials developed under BMP 6B.

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

Evaluate at least one salt/chloride alternative for use in the municipality. Implement program for winter road maintenance throughout permit term beginning in Permit Year 4.

BMP: Stormwater Treatment Structures Inspection and Maintenance Procedures

BMP Number (Optional) **6D-4** **Completed** (by year 4) ☒

Document Name and/or Web Address: Good Housekeeping and Pollution Prevention Program for Municipal Operations and Maintenance, July 2021

Description:

By June 30, 2022, implement procedures to inspect and maintain Town-owned structural stormwater BMPs within the urbanized area. Inspect stormwater treatment structures annually by June 30, beginning in Year 4.

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

Develop an inventory of Town-owned structural stormwater BMPs in the urbanized area within five years of permit effective date. Annually report on inspection and maintenance conducted.

BMP: SWPPP

BMP Number (Optional) **6C** **Completed** (by year 4) ☒

Document Name and/or Web Address: N/A

Description:

N/A - The Town identified that the Highway Garage property is located outside of the urbanized area, and therefore, a SWPPP is not required for this facility.

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

N/A

BMP: N/A

BMP Number (Optional) **Completed** ☐

Document Name and/or Web Address:

Description:

N/A

Responsible Department/Parties:

Measurable Goal(s):

Add BMP

Annual Evaluation

Year 1 Annual Report

Document Name and/or Web Address:

Ihttps://www3.epa.gov/region1/npdes/stormwater/ma/reports/2019/winchendon-ma-ar19.pdf
AND in Appendix H

Year 2 Annual Report

Document Name and/or Web Address:

https://www3.epa.gov/region1/npdes/stormwater/ma/reports/2020/winchendon-ma-ar20.pdf
AND in Appendix H

Year 3 Annual Report

Document Name and/or Web Address:

https://www3.epa.gov/region1/npdes/stormwater/ma/reports/2021/WINCHENDON_MA_AR21.pdf

Year 4 Annual Report

Document Name and/or Web Address:

Insert link to EPA website or include a copy in Appendix H when complete.

Year 5 Annual Report

Document Name and/or Web Address:

Insert link to EPA website or include a copy in Appendix H when complete.

Year X Annual Report

Document Name and/or Web Address:

Insert link to EPA website or include a copy in Appendix H when complete.

Add a Year

TMDLs and Water Quality Limited Waters

Select the applicable Impairment(s) and/or TMDL(s).

Impairment(s)

☐ Bacteria/Pathogens ☐ Chloride ☐ Nitrogen ☐ Phosphorus

☐ Solids/oil/grease (hydrocarbons)/metals

TMDL(s)

In State:

☐ Assabet River Phosphorus ☐ Bacteria and Pathogen ☐ Cape Cod Nitrogen

☐ Charles River Watershed Phosphorus ☒ Lake and Pond Phosphorus

Out of State:

☐ Bacteria and Pathogen ☐ Metals ☒ Nitrogen ☐ Phosphorus

Clear Impairments and TMDLs

Nitrogen

Combination of Impaired Waters Requirements and TMDL Requirements as Applicable

Applicable Receiving Waterbody(ies)	TMDL Name (if applicable)	Add/Delete Row
Millers River (MA35-01, MA35-02, MA35-20)	Long Island Sound Nitrogen TMDL	+ -

Annual Requirements Beginning Year 3

Public Education and Outreach

(Public education messages can be combined with other public education requirements as applicable (see Appendix H and F for more information))

Distribute an annual message in the spring (April/May) that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release fertilizers

The relevant BMP number(s) listed above in the Stormwater Management Program OR the description of implementation actions and document location(s) are:

The Town of Winchendon will supplement its residential and commercial/institutional public education programs described in BMPs 1A and 1B with an annual spring message encouraging the proper disposal of grass clippings and the use of slow-release fertilizers.

Distribute an annual message in the summer (June/July) encouraging the proper management of pet waste, including noting any existing ordinances where appropriate

The relevant BMP number(s) listed above in the Stormwater Management Program OR the description of implementation actions and document location(s) are:

The Town of Winchendon will supplement its residential and commercial/institutional public education programs described in BMPs 1A and 1B with an annual summer message encouraging the proper management of pet waste and noting Section 173 of the Town of Winchendon Bylaws.

Distribute an annual message in the fall (August/September/October) encouraging the proper disposal of leaf litter

The relevant BMP number(s) listed above in the Stormwater Management Program OR the description of implementation actions and document location(s) are:

The Town of Winchendon will supplement its residential and commercial/institutional public education programs described in BMPs 1A and 1B with an annual fall message encouraging the proper disposal of leaf litter.

Good Housekeeping and Pollution Prevention for Permittee Owned Operations

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Establish requirements for the use of slow release fertilizers on permittee owned property currently using fertilizer, in addition to reducing and managing fertilizer use as provided in part 2.3.7.1

The relevant BMP number(s) listed above in the Stormwater Management Program OR the description of implementation actions and document location(s) are:

BEGIN IN PERMIT YEAR 4 (Note: EPA Template provides incorrect deadline). As part of the Operations & Maintenance procedures for Town-owned parks and open spaces established as part of BMP 6A, the Town of Winchendon will establish requirements for use of slow release fertilizer on Town-owned property currently using fertilizer and encourage reduction of fertilizer use.

Establish procedures to properly manage grass cuttings and leaf litter on permittee property, including prohibiting blowing organic waste materials onto adjacent impervious surfaces

The relevant BMP number(s) listed above in the Stormwater Management Program OR the description of implementation actions and document location(s) are:

BEGIN IN PERMIT YEAR 4 (Note: EPA Template provides incorrect deadline). As part of the Town's Operations & Maintenance procedures for Town-owned properties established as part of BMP 6A, the Town of Winchendon will establish a program to properly manage grass cuttings and leaf litter on Town-owned properties. This program will prohibit blowing organic waste onto impervious surfaces.

Increase street sweeping frequency of all municipal owned streets and parking lots subject to Permit part 2.3.7.a.iii.(c) to a minimum of two times per year (spring and fall)

The relevant BMP number(s) listed above in the Stormwater Management Program OR the description of implementation actions and document location(s) are:

BEGIN IN PERMIT YEAR 4 (Note: EPA Template provides incorrect deadline). As part of the Town's Operation & Maintenance procedures for street and parking lot sweeping established as part of BMP 6D-2, the Town of Winchendon will increase street and parking lot sweeping to a minimum of two occurrences per year, once in the spring and once in the fall. For rural streets with no curbs or catch basins, the Town must sweep at least once per year or develop a targeted inspection and sweeping plan for those streets, per Section 2.3.7.a.iii.3 of the permit.

Nitrogen Reduction Tracking BMP

Any structural BMPs listed in Table 3 of Attachment 1 to Appendix H already existing or installed in the regulated area by the permittee or its agents shall be tracked and the permittee shall estimate the nitrogen removal by the BMP consistent with Attachment 1 to Appendix H. .

The BMP type, total area treated by the BMP, the design storage volume of the BMP and the estimated nitrogen removed in mass per year by the BMP is found in the following document or website and is updated yearly at a minimum:

This information will be recorded in Appendix I of this document and updated annually.

Requirements Due by Year 4

Stormwater Management in New Development and Redevelopment

The requirement for adoption/amendment of the permittee's ordinance or other regulatory mechanism shall include a requirement that new development and redevelopment stormwater management BMPs be optimized for nitrogen removal

The relevant BMP number(s) listed above in the Stormwater Management Program OR the description of implementation actions and document location(s) are:

The Post-Construction Bylaw, developed under BMP 5A, and any associated regulations shall require new development and redevelopment stormwater management BMPs to be optimized for nitrogen removal.

Requirements Due by Year 6

Complete a Nitrogen Source Identification Report

The document name (if attached) and/or web address is/are:

The Town of Winchendon shall complete the Nitrogen Source Identification Report by June 30, 2024, which will include the following components:

- calculation of the total MS4 area draining to the Long Island Sound or its tributaries, including updated mapping and catchment delineations completed under the IDDE program;
- all screening and monitoring results targeting the Long Island Sound;
- impervious area and directly connected impervious area for the Long Island Sound catchment area;
- identification, delineation and prioritization of potential catchments with high nitrogen loading; and
- identification of potential retrofit opportunities or opportunities for the installation of structural BMPs during redevelopment.

The Nitrogen Source Identification Report will be included in Appendix I when complete.

Stormwater Management in New Development and Redevelopment

Retrofit inventory and priority ranking under 2.3.6.1.b. shall include consideration of BMPs to reduce nitrogen discharges

The relevant BMP number(s) listed above in the Stormwater Management Program OR the description of implementation actions and document location(s) are:

The Retrofit Feasibility Assessment described in BMP 5D will include consideration of BMPs to reduce nitrogen discharges.

Requirements Due by Year 7

Potential Structural BMPs

Evaluate all permittee-owned properties identified as presenting retrofit opportunities or areas for structural BMP installation under Permit part 2.3.6.d.ii or identified in the Nitrogen Source Identification Report that are within the drainage area of the impaired water or its tributaries

The relevant BMP number(s) listed above in the Stormwater Management Program OR the description of implementation actions and document location(s) are:

The Town of Winchendon will evaluate properties identified in the Retrofit Feasibility Assessment and the Nitrogen Source Identification report that are within the drainage area of the Long Island Sound or its tributaries, for structural BMP installation. The evaluation will be included in Appendix I when complete.

Complete a listing of planned structural BMPs and a plan and schedule for implementation

The relevant BMP number(s) listed above in the Stormwater Management Program OR the description of implementation actions and document location(s) are:

The Town of Winchendon will provide a list of planned structural BMPs and a plan and schedule for implementation. The document will be included in Appendix I when complete.

Lake and Pond Phosphorus TMDL

Complete Phase 1 of the Lake Phosphorus Control Plan by year 7.

Applicable Receiving Waterbody(ies)	PCP Complete	Document Location	Add/Delete Row
Lake Denison, Stoddard Pond, Whitney Pond, Whites Mill Pond	☐	Appendix I (when complete)	+ -

Appendix A

Town Specific MS4 Background

Winchendon is located in Worcester County, approximately 35 miles northwest of the City of Worcester, and borders the Massachusetts/New Hampshire state line. There are approximately 0.8 square miles of open water within its 44.1 square mile footprint. According to the 2010 United States Census, Winchendon is home to approximately 10,300 residents in more than 3,800 households. The Town of Winchendon is a new permittee that was not regulated under the 2003 Small MS4 General Permit. Downtown Winchendon and neighborhoods along Route 202 are within the Urbanized Area, as seen in Figure 2, and therefore, regulated by EPA under the 2016 MS4 program.

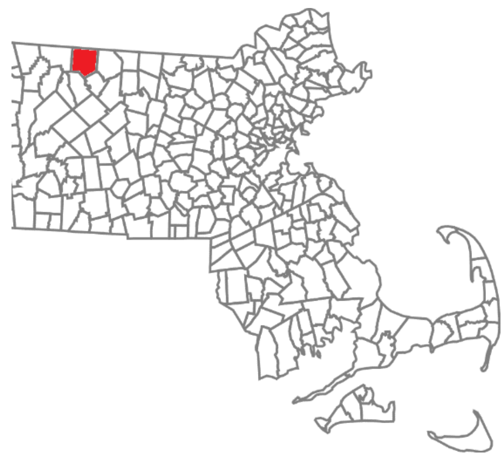

Figure 1 Location of Winchendon, Massachusetts

The Town of Winchendon is located entirely within the Millers River Watershed, which eventually discharges to the Connecticut River. Protecting the quality of Winchendon's water resources, including lakes, ponds, rivers and groundwater supplies, is a priority for the Town. Pollutants from stormwater runoff are a contributing factor to the impairment of Winchendon's waterbodies, including bacterial contamination and nutrient pollution.

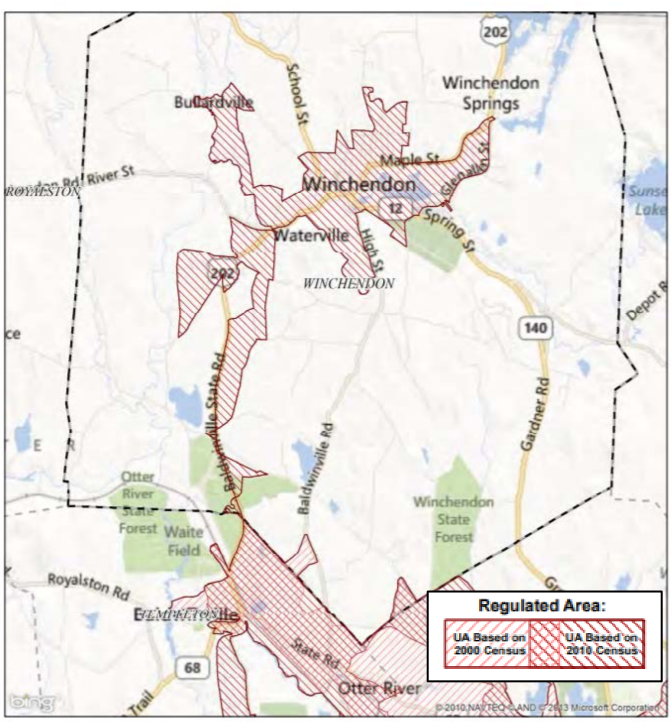

Figure 2 Urbanized Area in Winchendon, MA

Although Winchendon is a new permittee, the Town has taken action towards protecting its water resources and reducing pollution in stormwater runoff. In 2009, the Town worked with the Millers River Watershed Council to develop Low Impact Development (LID) Regulations that require all new development and redevelopment projects disturbing more than 20,000 square feet within Winchendon to develop an LID Management Plan, Operations & Maintenance Plan and Erosion Sediment Control Plan, and to apply for a permit from the Town.

Appendix B

Notice of Intent, System Map and
Authorization to Discharge Letter from EPA

Notice of Intent (NOI) for coverage under Small MS4 General Permit

Part I: General Conditions

General Information

Name of Municipality or Organization: Town of Winchendon

State: MA

EPA NPDES Permit Number (if applicable):

Primary MS4 Program Manager Contact Information

Name: Albert Gallant

Title: DPW Director

Street Address Line 1: 109 Front Street

Street Address Line 2:

City: Winchendon

State: MA

Zip Code: 01475

Email: agallant@townofwinchendon.com

Phone Number: (978) 297-0170

Fax Number:

Other Information

Stormwater Management Program (SWMP) Location (web address or physical location, if already completed): Once complete, SWMP will be available at Department of Public Works at 109 Front Street and online: https://www.townofwinchendon.com/public-works

Eligibility Determination

Endangered Species Act (ESA) Determination Complete? Yes

Eligibility Criteria (check all that apply): ☐ A ☐ B ☒ C

National Historic Preservation Act (NHPA) Determination Complete? Yes

Eligibility Criteria (check all that apply): ☒ A ☐ B ☐ C

☐ Check the box if your municipality or organization was covered under the 2003 MS4 General Permit

Notice of Intent (NOI) for coverage under Small MS4 General Permit

Part II: Summary of Receiving Waters

Please list the waterbodies to which your MS4 discharges. For each waterbody, please report the number of outfalls discharging into it and, if applicable, the segment ID and any impairments.

Massachusetts list of impaired waters: [*Massachusetts 2014 List of Impaired Waters*- http://www.mass.gov/eea/docs/dep/water/resources/07v5/14list2.pdf](http://www.mass.gov/eea/docs/dep/water/resources/07v5/14list2.pdf)

Waterbody that receives flow from the MS4 and segment ID if applicable	**Number of outfalls into receiving water segment**	**Chloride**	**Chlorophyll-a**	**Dissolved Oxygen/ DO Saturation**	**Nitrogen**	**Oil & Grease/ PAH**	**Phosphorus**	**Solids/ TSS/ Turbidity**	**E. coli**	**Enterococcus**	**Other pollutant(s) causing impairments**
Millers River (MA35-01)	Unknown*	☐	☐	☐	☐	☐	☒	☐	☐	☐	Ambient Bioassays -- Chronic Aquatic Toxicity, Fecal Coliform, PCB in Fish Tissue
Millers River (MA35-02)	Unknown*	☐	☐	☐	☐	☐	☐	☐	☐	☐	PCB in Fish Tissue
Millers River (MA35-20)	Unknown*	☐	☐	☐	☐	☐	☐	☐	☐	☐	
North Branch Millers River (MA35-21)	Unknown*	☐	☐	☐	☐	☐	☐	☐	☐	☐	Mercury in Fish Tissue
Otter River (MA35-08)	Unknown*	☐	☐	☐	☐	☐	☐	☒	☐	☐	Total Dissolved Solids, Aquatic Macroinvertebrate Bioassessments, Fecal Coliform, Fishes Bioassessments, Nutrient/Eutrophication Biological Indicators, PCB in Fish Tissue, Taste and Odor
Whitney Pond (MA35101)	Unknown*	☐	☐	☐	☐	☐	☐	☐	☐	☐	Mercury in Fish Tissue
Whites Mill Pond (MA35099)	Unknown*	☐	☐	☐	☐	☐	☐	☐	☐	☐	Mercury in Fish Tissue
Lake Denison (MA35017)	Unknown*	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Tannery Pond	Unknown*	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Beamen Pond	Unknown*	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Beamen Brook	Unknown*	☐	☐	☐	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	☐	
*See note 3 in Part IV		☐	☐	☐	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	☐	
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Notice of Intent (NOI) for coverage under Small MS4 General Permit

Part III: Stormwater Management Program Summary

Identify the Best Management Practices (BMPs) that will be employed to address each of the six Minimum Control Measures (MCMS). For municipalities/organizations whose MS4 discharges into a receiving water with an approved Total Maximum Daily Load (TMDL) and applicable waste load allocation (WLA), identify any additional BMPs employed to specifically support the achievement of the WLA in the TMDL section at the end of Part III.

For each MCM, list each existing or proposed BMP by category and provide a brief description, responsible parties/departments,measurable goals, and the year the BMP will be employed (public education and outreach BMPs also require a target audience).

MCM 1: Public Education and Outreach

BMP ID	BMP Media/Category	BMP Description	Targeted Audience	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
1A	Multi-media methods (including web and print materials at public buildings)	Education and outreach on stormwater management topics of significance in Winchendon (including proper pet waste management, proper use of pesticides and fertilizers). Educational topics will include but are not limited to those in Part 2.3.2.d.i	Residents	Department of Public Works	Distribute a minimum of one (1) educational message	2019 (PY2)
1B	Multi-media methods (including web and print materials at public buildings)	Education and outreach on stormwater management topics of significance in Winchendon (including proper lawn maintenance, parking lot sweeping). Educational topics will include but are not limited to those in Part 2.3.2.d.ii	Businesses, Institutions, and Commercial Facilities	Department of Public Works	Distribute a minimum of one (1) educational message	2020 (PY3)

Notice of Intent (NOI) for coverage under Small MS4 General Permit

BMP ID	BMP Media/Category	BMP Description	Targeted Audience	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
1C	Multi-media methods (including web and permit application attachment)	Education and outreach on stormwater management topics of significance in Winchendon (including proper erosion and sedimentation control, permit requirements, design standards). Educational topics will include but are not limited to those in Part 2.3.2.d.iii	Developers (Construction)	Planning/ Conservation	Distribute a minimum of one (1) educational message	2019 (PY2)
1D	Multi-media methods (including web)	Education and outreach on stormwater management topics of significance in Winchendon (including pollution prevention, illicit discharges, Multi-Sector General Permit). Educational topics will include but are not limited to those in Part 2.3.2.d.iv	Industrial Facilities	Department of Public Works	Distribute a minimum of one (1) educational message	2020 (PY3)

Notice of Intent (NOI) for coverage under Small MS4 General Permit

Part III: Stormwater Management Program Summary

MCM 2: Public Involvement and Participation

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
2A	Public Review	SWMP Review (Plan and reports available on web and at public meetings)	Department of Public Works	Annually provide the public with an opportunity to participate in the review and implementation of the SWMP	2018 (PY1)
2B	Public Participation	Provide opportunities for public involvement and participation in Winchendon's stormwater program (including clean up events). Specific activities, schedule, and lead departments are included in the SWMP.	Department of Public Works	Ongoing opportunities available to the public	2018 (PY1)

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Notice of Intent (NOI) for coverage under Small MS4 General Permit

Part III: Stormwater Management Program Summary

MCM 3: Illicit Discharge Detection and Elimination (IDDE)

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
3A	IDDE Bylaw	Develop local bylaw and regulations, if necessary, to contain new MS4 provisions per section 2.3.4	Board of Health/ Department of Public Works	Complete within three (3) years of effective date of permit.	2020 (PY3)
3B	SSO Inventory	Develop SSO inventory in accordance of permit conditions	Department of Public Works	Complete within four (4) years of effective date of permit. Track # of SSOs identified and removed annually	2020 (PY3)
3C	Storm sewer system map	Create map and update during IDDE program implementation	Department of Public Works/ Planning Department	Update map within five (5) years of effective date of permit and complete full system map 13 years after effective date of permit	2020 (PY3)
3D	Written IDDE program	Create written IDDE program	Department of Public Works	Complete within four (4) years of the effective date of permit and update as required	2020 (PY3)
3E-1	Assessment and Priority Ranking of Outfalls & Interconnections	Outfall/Interconnection Inventory and Initial Ranking as part of BMP 3D	Department of Public Works	Complete within four (4) years of the effective date of permit and update as necessary	2020 (PY3)
3E-2	Assessment and Priority Ranking of Outfalls & Interconnections	Dry Weather Outfall Screening & Sampling in accordance with IDDE Plan and permit conditions	Department of Public Works	Complete six (6) years after effective date of permit. Track # of illicit discharges identified & volume removed. Summarize screening/sampling results.	2020 (PY3)

Notice of Intent (NOI) for coverage under Small MS4 General Permit

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
3E-3	Assessment and Priority Ranking of Outfalls & Interconnections	Catchment Investigations according to IDDE Program and permit conditions	Department of Public Works	Complete 13 years after effective date of permit. Track # and percentage of MS4 catchments evaluated. Track # of illicit discharges identified & volume removed. Summarize screening/sampling results.	2021 (PY4)
3F	Employee Training	Train employees on IDDE implementation	Department of Public Works	Train annually. Track employees trained, training topic, date/time, and materials presented.	2020 (PY3)

Notice of Intent (NOI) for coverage under Small MS4 General Permit

Part III: Stormwater Management Program Summary

MCM 4: Construction Site Stormwater Runoff Control

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
4A	Construction Bylaw and Regulations	Develop local bylaw and/or regulations, if necessary, to contain MS4 provisions per Part 2.3.5.	Planning/ Conservation/ Building Inspector/ Zoning Department	Complete within three (3) years of effective date of permit.	2020 (PY3)
4B	Construction Policy and Procedures	Develop and implement written procedures for site inspections and enforcement procedures per Part 2.3.5.	Planning/ Conservation/ Building Inspector/ Zoning Department	Review current procedures and modify if necessary within three (3) years of permit effective date	2020 (PY3)

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Notice of Intent (NOI) for coverage under Small MS4 General Permit

Part III: Stormwater Management Program Summary

MCM 5: Post-Construction Stormwater Management in New Development and Redevelopment

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
5A	Post-Construction Bylaw and Regulations	Develop local bylaw and/or regulations to contain new MS4 provisions per Part 2.3.6.a.	Planning Department/ Conservation	Complete within three (3) years of effective date of permit.	2020 (PY3)
5B	Assess street and parking lot guidelines	Develop a report assessing requirements that affect the creation of impervious cover. The assessment will help determine if changes to design standards for streets and parking lots can be modified to support low impact design options.	Planning Department	Complete report no later than six (6) years of permit effective date	2022 (PY5)
5C	Assess allowing green infrastructure	Develop a report assessing existing local regulations to determine the feasibility of making green infrastructure practices allowable when appropriate site conditions exist	Planning Department	Complete report no later than six (6) years of permit effective date	2022 (PY5)
5D	Retrofit Feasibility Assessment	Conduct detailed inventory of Town-owned properties and rank for retrofit potential	Department of Public Works	Complete report no later than six (6) years of permit effective date. Beginning in Permit Year 5, keep running list of at least five (5) retrofit sites	2022 (PY5)

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Notice of Intent (NOI) for coverage under Small MS4 General Permit

Part III: Stormwater Management Program Summary

MCM 6: Municipal Good Housekeeping and Pollution Prevention

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Additional Description/Measurable Goal	Beginning Year of BMP Implementation
6A	Operation & Maintenance Program	Inventory and create O&M procedures for all permittee-owned parks and open spaces, buildings and facilities (including their storm drains), and vehicles and equipment	Department of Public Works/ School Department	Complete four (4) years after permit effective date, implement in following years	2021 (PY4)
6B	Operation & Maintenance Program	Establish and implement program for repair and rehabilitation of MS4 infrastructure	Department of Public Works	Complete four (4) years after permit effective date, implement in following years	2021 (PY4)
6C	Stormwater Pollution Prevention Plans (SWPPP)	Develop and implement a SWPPP for DPW facility	Department of Public Works	Complete SWPPPs within four (4) years of permit effective date, implement in following years	2021 (PY4)
6D-1	Operation & Maintenance Program	Implement procedures to optimize catch basin cleaning developed under BMP 6B	Department of Public Works	Track frequency and material quantity of catch basin cleaning in town. In PY4 Annual Report and in SWMP, document plan for optimizing catch basin cleaning and implement plan.	2018 (PY1)
6D-2	Operation & Maintenance Program	Implement procedures for street and parking lot sweeping developed under BMP 6A	Department of Public Works	Annually track number of miles cleaned or the volume or mass of material removed. Implement plan starting PY4.	2018 (PY1)
6D-3	Operation & Maintenance Program	Implement procedures for use and storage of deicing materials developed under BMP 6A	Department of Public Works	Improve program for winter road maintenance by implementing plan in PY4.	2018 (PY1)

Notice of Intent (NOI) for coverage under Small MS4 General Permit

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Additional Description/Measurable Goal	Beginning Year of BMP Implementation
6D-4	Operation & Maintenance Program	Implement procedures to inspect and maintain Town-owned structural stormwater BMPs	Department of Public Works	Develop an inventory of Town-owned BMPs within five (5) years of permit effective date. Report on inspection and maintenance conducted annually.	2018 (PY1)

Notice of Intent (NOI) for coverage under Small MS4 General Permit

Part III: Stormwater Management Program Summary (continued)

Actions for Meeting Total Maximum Daily Load (TMDL) Requirements

Use the drop-down menus to select the applicable TMDL, action description to meet the TMDL requirements, and the responsible department/parties. If no options are applicable, or more than one, **enter your own text to override drop-down menus.**

Applicable TMDL	Action Description	Responsible Department/Parties (enter your own text to override the drop down menu)
Millers Basin Lakes (Phosphorus)	Adhere to requirements in part A.II of Appendix F	Engineering
Long Island Sound TMDL (Nitrogen)	Adhere to requirements in part B.I of Appendix F	Engineering

Notice of Intent (NOI) for coverage under Small MS4 General Permit

Part III: Stormwater Management Program Summary (continued)

Actions for Meeting Requirements Related to Water Quality Limited Waters

Use the drop-down menus to select the pollutant causing the water quality limitation and enter the waterbody ID(s) experiencing excursions above water quality standards for that pollutant. In addition, if you are subject to additional requirements due to a downstream nutrient impairment (see Part 2.2.2 of the permit) select the pollutant of concern and indicate applicable waterbody IDs or write "all waterbodies" if applicable. Choose the action description from the dropdown menu and indicate the responsible party. If no options are applicable, or more than one, **enter your own text to override drop-down menus.**

Pollutant	Waterbody ID(s)	Action Description	Responsible Department/Parties (enter your own text to override the drop down menu)
Phosphorus	Millers River (MA35-01)	Adhere to requirements in part II of Appendix H	Engineering
Fecal Coliform	Millers River (MA35-01)	Adhere to requirements in part III of Appendix H	Engineering
Fecal Coliform	Otter River (MA35-08)	Adhere to requirements in part III of Appendix H	Engineering
Turbidity	Otter River (MA35-08)	Adhere to requirements in part V of Appendix H	Engineering

Part IV: Notes and additional information

Use the space below to indicate the part(s) of 2.2.1and 2.2.2 that you have identified as not applicable to your MS4 because you do not discharge to the impaired water body or a tributary to an impaired water body due to nitrogen or phosphorus. Provide all supporting documentation below or attach additional documents if necessary. Also, provide any additional information about your MS4 program below.

1. The National Endangered Species Eligibility Determination screening process has been completed and the Town of Winchendon meets Criterion C. The Town's stormwater discharges and discharge related activities will have no affect on listed species or critical habitat. The Town will consult with U.S. Fish and Wildlife as needed during the permit term.

2. The National Historic Preservation Act Eligibility Determination screening process has been completed and the Town of Winchendon meets Criterion A. The Town's stormwater discharges do not have the potential to cause effects on historic properties. The Town will consult with the State Historic Preservation Officer as needed during the permit term.

3. Since Winchendon is a new permittee under the 2016 Small MS4 General Permit, the number of outfalls is currently unknown. The attached map shows the status of the Town's current drainage system mapping. The receiving waters in Part II are based on a review of available information (i.e., EPA's 2014 Integrated List of Waters, USGS mapping, Winchendon's regulated area map, etc.) and include potential receiving waters within and adjacent to the Town's urbanized area that may or may not receive stormwater discharges from the MS4. The receiving waters will be modified to reflect actual MS4 discharges as mapping is improved throughout the permit term. Changes to the outfall inventory, receiving waters, and drainage mapping will be formalized in Annual Reports to EPA.

Detailed explanations of the above notes will be included in the Town's Stormwater Management Plan.

Part V: Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: Keith R. Hickey

Title: Town Manager

Signature: KRH

Date: 9-27-18

[To be signed according to Appendix B, Subparagraph B.11, Standard Conditions]

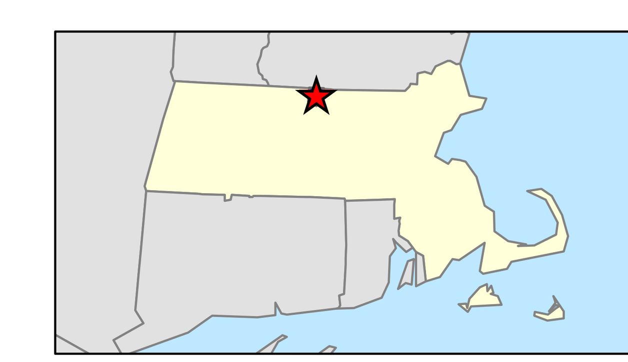
Note: When prompted during signing, save the document under a new file name

TOWN OF WINCHENDON STORMWATER

G:\GIS\MA\WinchendonMA\avproj\stormwater.mxd

Legend

- Drain Manhole
- Catch Basins
- Drain Pipes
- 2010 Urbanized Areas
- Tax Parcels
- Town Boundary



1 inch = 600 feet

Feet
0 250 500 1,000 1,500 2,000

Tighe&Bond
Consulting Engineers
Environmental Specialists

December, 2015

W-2087

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MA 02109-3912

VIA EMAIL

April 5, 2019

Keith R. Hickey
Town Manager

And;

Albert Gallant
DPW Director
109 Front Street
Winchendon, MA. 01475
agallant@townofwinchendon.com

Re: National Pollutant Discharge Elimination System Permit ID #: MAR041244, Town of Winchendon

Dear Albert Gallant:

The 2016 NPDES General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts (MS4 General Permit) is a jointly issued EPA-MassDEP permit. Your Notice of Intent (NOI) for coverage under this MS4 General Permit has been reviewed by EPA and appears to be complete. You are hereby granted authorization by EPA and MassDEP to discharge stormwater from your MS4 in accordance with the applicable terms and conditions of the MS4 General Permit, including all relevant and applicable Appendices. This authorization to discharge expires at midnight on **June 30, 2022.**

For those permittees that certified Endangered Species Act eligibility under Criterion C in their NOI, this authorization letter also serves as EPA's concurrence with your determination that your discharges will have no effect on the listed species present in your action area, based on the information provided in your NOI.

As a reminder, your first annual report is due by **September 30, 2019** for the reporting period from May 1, 2018 through June 30, 2019.

Information about the permit and available resources can be found on our website: https://www.epa.gov/npdes-permits/massachusetts-small-ms4-general-permit. Should you have any questions regarding this permit please contact Newton Tedder at tedder.newton@epa.gov or (617) 918-1038.

Sincerely,

Thelma Murphy, Chief
Stormwater and Construction Permits Section
Office of Ecosystem Protection
United States Environmental Protection Agency, Region 1

and;

Lealdon Langley, Director
Wetlands and Wastewater Program
Bureau of Water Resources
Massachusetts Department of Environmental Protection

Appendix C

Endangered Species Act Eligibility Criteria Documentation

Endangered Species Act Eligibility Certification

TO: Town of Winchendon Stormwater Management Program Files

FROM: Tighe & Bond

COPY: Al Gallant, DPW Director
Keith R. Hickey, Town Manager

DATE: April 18, 2019

Tighe & Bond has completed the National Endangered Species Eligibility Determination screening process in accordance with Part 1.9.1 and Appendix C of U.S. EPA's National Pollutant Discharge Elimination System (NPDES) General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) in Massachusetts (see Attachment A of this memorandum), effective July 1, 2018, and determined that the **Town of Winchendon** meets **Criterion C**, where it was determined that the stormwater discharges and discharge related activities will have "no affect" on listed species or critical habitat.

Tighe & Bond followed EPA's screening process required by the 2016 Small MS4 General Permit as follows:

Tighe & Bond went to the USFWS Information for Planning and Consultation (IPaC) website[1] and created an IPaC Trust Resources Report and an Official Species List from the USFWS New England Ecological Services Field Office, included in Attachment B to this memorandum. The Official Species List lists the following species that may occur or could potentially be affected by activities in the Town:

- Northern Long-eared Bat.

This report documents that there are **no critical habitats in Winchendon**.

Tighe & Bond then went to the USFWS New England Field Office website for Endangered Species Reviews/Consultations[2] and selected the Massachusetts state list[3] to review which Towns have federally-listed species. A copy of the list of Federally Listed Endangered and Threatened Species in Massachusetts is included in Attachment C to this memorandum. Based on review of this list, the Northern Long-eared Bat is listed statewide, and no additional species were identified in Winchendon.

Tighe & Bond then reviewed Step 1 Part B of the USFWS endangered species consultation, and visited the Massachusetts Natural Heritage and Endangered Species Program (NHESP) species information and conservation website about the Northern Long-eared Bat[4]. The NHESP website included a map showing the known locations of the Northern Long-eared Bat within Massachusetts. Attachment C includes a map showing there are **no roost trees or hibernating locations within or adjacent to Winchendon**.

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[1] http://ecos.fws.gov/ipac/
[2] https://www.fws.gov/newengland/EndangeredSpec-Consultation_Project_Review.htm
[3] https://www.fws.gov/newengland/pdfs/MA%20species%20by%20town.pdf
[4] http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/species-information-and-conservation/rare-mammals/northern-long-eared-bat.html

Based on the results of the NHESP website review, Tighe & Bond determined there is no potential habitat for any listed species within the action area and therefore **no further coordination is required with the USFWS**. Attachment E provides the USFWS "no species present" letter that states that "no species are known to occur in the project area."

As described in the supplemental guidance document "Stormwater Management Notice of Intent (NOI) Frequently Asked Questions"[5] if it determined that the municipality in review only contains the Northern Long-eared Bat and it is agreed that discharges will have no effect on the species, the municipality is not required to contact USFWS. However, as described in Step 3, Question 3 below, the Town of Winchendon will consult with USFWS as needed during the permit term on any future BMPs.

Step 1 – Determine if you can meet USFWS Criterion A

"USFWS Criterion A: You can certify eligibility, according to USFWS Criterion A, for coverage by this permit if, upon completing the Information, Planning, and Conservation (IPaC) online system process, you printed and saved the preliminary determination which indicated that federally listed species or designated critical habitats are not present in the action area. See Attachment 1 to Appendix C for instructions on how to use IPaC."

No, the Town of Winchendon's IPaC action area contains the Northern Long-eared Bat.

Step 2 – Determine if You Can Meet Eligibility USFWS Criteria B

"USFWS Criterion B: You can certify eligibility according to USFWS Criteria B for coverage by this permit if you answer "Yes" to **all** of the following questions:

1) Does your action area contain one or more of the following species: Sandplain gerardia, Small whorled Pogonia, American burying beetle, Dwarf wedgemussel, Northeastern bulrush, Piping Plover, Northern Red-bellied cooter, Bog Turtle, Roseate Tern, Puritan tiger beetle, and Northeastern beach tiger beetle?"

   No, the Town of Winchendon's action area does not contains any of the above-referenced species.

2) Did your assessment of the discharge and discharge related activities indicate that the discharge or discharge related activities "may affect" or are "not likely to adversely affect" listed species or critical habitat?

   No, based on EPA guidance for the listed species, Tighe & Bond has determined that the Town's discharges and discharge related activities will have "no affect" on listed species or critical habitat (see discussion above).

Step 3 – Determine if You Can Meet Eligibility USFWS Criteria C

"You can certify eligibility according to USFWS Criterion C for coverage by this permit if you answer "Yes" to both of the following questions:

1) Does your action area contain one or more of the following species: Northern Long-eared Bat, Sandplain gerardia, Small whorled Pogonia and/or American burying beetle and does not contain any following species: Dwarf wedgemussel, Northeastern bulrush, Piping

[5] https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/sw-mgmt-noi-faqs-ma-nh.pdf

Plover, Northern Red-bellied cooter, Bog Turtle, Roseate Tern, Puritan tiger beetle, and Northeastern beach tiger beetle?

Yes, the Town of Winchendon's action area contains the Northern Long-eared Bat, but none of the other subsequent species.

2) Did the assessment of your discharge and discharge related activities indicate that there would be "no affect" on listed species or critical habitat and EOA provided concurrence with your determination?

   Yes, Tighe & Bond performed an informal consultation with USFWS and determined that the Town's discharges and discharge related activities will have "no affect" on listed species or critical habitat (see discussion above).

3) Do you agree that if, during the course of the permit term, you plan to install a structural BMP not identified in the NOI that you will conduct an endangered species screening for the proposed site and contact the USFWS if you determine that the new activity "may affect" or is "not likely to adversely affect" listed species or critical habitat under the jurisdiction of the USFWS."

   Yes, during the course of the permit term the Town of Winchendon agrees to conduct an endangered species screening for the proposed site and contact USFWS if they plan to install a structural BMP not identified in the NOI.

Tighe & Bond's review of all questions under Step 3 resulted in "Yes" and thereby we determined the Town of Winchendon's action area meets the endangered species' eligibility requirements included in **Criterion C**.

\\tighebond.com\data\Data\Projects\W\W1157 Winchendon\050 NPDES Small MS4 GP NOI\NOI\Supplemental Docs\ESA Cert\ESA Cert.docx

Attachment A

Excerpts from EPA's NPDES General Permits for Stormwater Discharges from Small MS4s in Massachusetts

Appendix C – Endangered Species Guidance

APPENDIX C
ENDANGERED SPECIES GUIDANCE

A. Background

In order to meet its obligations under the Clean Water Act and the Endangered Species Act (ESA), and to promote the goals of those Acts, the Environmental Protection Agency (EPA) is seeking to ensure the activities regulated by this general permit do not adversely affect endangered and threatened species or critical habitat. Applicants applying for permit coverage must assess the impacts of their stormwater discharges and discharge-related activities on federally listed endangered and threatened species ("listed species") and designated critical habitat ("critical habitat") to ensure that those goals are met. Prior to obtaining general permit coverage, applicants must meet the ESA eligibility provisions of this permit by following the steps in this Appendix[1].

Applicants also have an independent ESA obligation to ensure that their activities do not result in any prohibited "take" of listed species[12]. The term "Take" is used in the ESA to include harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering. "Harass" is defined as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Many of the measures required in this general permit and in these instructions to protect species may also assist in ensuring that the applicant's activities do not result in a prohibited take of species in violation of section 9 of the ESA. If the applicant has plans or activities in an area where endangered and threatened species are located, they may wish to ensure that they are protected from potential take liability under ESA section 9 by obtaining an ESA section 10 permit or by requesting formal consultation under ESA section 7. Applicants that are unsure whether to pursue a section 10 permit or a section 7 consultation for takings protection should confer with the appropriate United States Fish and Wildlife Service (USFWS) office or the National Marine Fisheries Service (NMFS), (jointly the Services).

Currently, there are 20 species of concern for applicants applying for permit coverage, namely the Dwarf wedgemussel *(Alasmidonta heterodon)*, Northeastern bulrush (*Scirpus ancistrochaetus*), Sandplain gerardia *(Agalinis acuta)*, Piping Plover (*Charadrius melodus*), Roseate Tern (*Sterna dougallii*), Northern Red-bellied cooter (*Pseudemys rubriventis)*, Bog Turtle (*Glyptemys muhlenbergii*), Small whorled Pogonia (*Isotria medeoloides*), Puritan tiger beetle (*Cicindela puritana*), American burying beetle (*Nicrophorus americanus*), Northeastern beach tiger beetle (*Cicindela dorsalis*), Northern Long-eared Bat *(Myotis septentriolis)*Atlantic Sturgeon *(Acipenser oxyrinchus*), Shortnose Sturgeon *(Acipenser brevirostrum)*, North Atlantic Right Whale (*Eubalaena glacialis*) Humpback Whale *(Megaptera novaengliae)*, Fin Whale (*Balaenoptera physalus)*, Kemp's Ridley Sea Turtle *(Lepidochelys kempii)*, Loggerhead Sea Turtle *(Caretta caretta)*, Leatherback Sea Turtle *(Dermochelys coriacea)*, and the Green Turtle *(Chelonia*

[1] EPA strongly encourages applicants to begin this process at the earliest possible stage to ensure the notification requirements for general permit coverage are complete upon Notice of Intent (NOI) submission.
[2] Section 9 of the ESA prohibits any person from "taking" a listed species (e.g. harassing or harming it) unless: (1) the taking is authorized through an "incidental take statement" as part of completion of formal consultation according to ESA section 7; (2) where an incidental take permit is obtained under ESA section 10 (which requires the development of a habitat conversion plan; or (3) where otherwise authorized or exempted under the ESA. This prohibition applies to all entities including private individuals, businesses, and governments.

mydas). The Atlantic Sturgeon, Shortnose Sturgeon, North Atlantic Right Whale, Humpback Whale, Fin Whale, Loggerhead Sea Turtle, Kemp's Ridley Sea Turtle, Leatherback Sea Turtle and Green Turtle are listed under the jurisdiction of NMFS. The Dwarf wedgemussel, Northeastern bulrush, Sandplain gerardia, Piping Plover, Northern Red-bellied cooter, Bog Turtle, Small whorled Pogonia, Roseate Tern, Puritan tiger beetle, Northeastern beach tiger beetle, Northern Long-eared Bat and American burying beetle are listed under the jurisdiction of the U.S. Fish and Wildlife Service.

Any applicant seeking coverage under this general permit, must consult with the Services where appropriate. When listed species are present, permit coverage is only available if EPA determines, or the applicant determines and EPA concurs, that the discharge or discharge related activities will have "no affect" on the listed species or critical habitat, or the applicant or EPA determines that the discharge or discharge related activities are "not likely to adversely affect" listed species or critical habitat and formal or informal consultation with the Services has been concluded and results in written concurrence by the Services that the discharge is "not likely to adversely affect" an endangered or threatened species or critical habitat.

EPA may designate the applicants as non-Federal representatives for the general permit for the purpose of carrying out formal or informal consultation with the Services (See 50 CFR §402.08 and §402.13). By terms of this permit, EPA has automatically designated operators as non-Federal representatives for the purpose of conducting formal or informal consultation with the U.S. Fish and Wildlife Service. EPA has not designated operators as non-Federal representatives for the purpose of conducting formal or informal consultation with the National Marine Fisheries Service. EPA has determined that discharges from MS4s are not likely to adversely affect listed species or critical habitat under the jurisdiction of the National Marine Fisheries Service. EPA has initiated informal consultation with the National Marine Fisheries Service on behalf of all permittees and no further action is required by permittees in order to fulfill ESA requirements of this permit related to species under the jurisdiction of NMFS

B. The U.S. Fish and Wildlife Service ESA Eligibility Process

Before submitting a notice of intent (NOI) for coverage by this permit, applicants must determine whether they meet the ESA eligibility criteria by following the steps in Section B of this Appendix. Applicants that cannot meet the eligibility criteria in Section B must apply for an individual permit.

The USFWS ESA eligibility requirements of this permit relating to the Dwarf wedgemussel, Northeastern bulrush, Sandplain gerardia, Piping Plover, Northern Red-bellied cooter, Bog Turtle, Small whorled Pogonia, Roseate Tern, Puritan tiger beetle, Northeastern beach tiger beetle, Northern Long-eared Bat and American burying beetle may be satisfied by documenting that one of the following criteria has been met:

USFWS Criterion A: No endangered or threatened species or critical habitat are in proximity to the stormwater discharges or discharge related activities.

USFWS Criterion B: In the course of formal or informal consultation with the Fish and Wildlife Service, under section 7 of the ESA, the consultation resulted in either a no jeopardy opinion (formal consultation) or a written concurrence by USFWS on a finding that the stormwater discharges and discharge related activities are "not likely to adversely affect" listed species or critical habitat (informal consultation).

USFWS Criterion C: Using the best scientific and commercial data available, the effect of the stormwater discharge and discharge related activities on listed species and critical habitat have been evaluated. Based on those evaluations, a determination is made by EPA, or by the applicant and affirmed by EPA, that the stormwater discharges and discharge related activities will have "no affect" on any federally threatened or endangered listed species or designated critical habitat under the jurisdiction of the USFWS.

1. The Steps to Determine if the USFWS ESA Eligibility Criteria Can Be Met

To determine eligibility, you must assess the potential effects of your known stormwater discharges and discharge related activities on listed species or critical habitat, PRIOR to completing and submitting a Notice of Intent (NOI). You must follow the steps outlined below and document the results of your eligibility determination.

Step 1 – Determine if you can meet USFWS Criterion A

USFWS Criterion A: You can certify eligibility, according to USFWS Criterion A, for coverage by this permit if, upon completing the Information, Planning, and Conservation (IPaC) online system process, you printed and saved the preliminary determination which indicated that federally listed species or designated critical habitats are not present in the action area. See Attachment 1 to Appendix C for instructions on how to use IPaC.

If you have met USFWS Criterion A skip to Step # 4.

If you have not met USFWS Criterion A, go to Step # 2.

Step 2 – Determine if You Can Meet Eligibility USFWS Criteria B

USFWS Criterion B: You can certify eligibility according to USFWS Criteria B for coverage by this permit if you answer "Yes" to **all** of the following questions:

1) Does your action area contain one or more of the following species: Sandplain gerardia, Small whorled Pogonia, American burying beetle, Dwarf wedgemussel, Northeastern bulrush, Piping Plover, Northern Red-bellied cooter, Bog Turtle, Roseate Tern, Puritan tiger beetle, and Northeastern beach tiger beetle?
   AND
2) Did your assessment of the discharge and discharge related activities indicate that the discharge or discharge related activities "may affect" or are "not likely to adversely affect" listed species or critical habitat?
   AND
3) Did you contact the USFWS and did the formal or informal consultation result in either a "no jeopardy" opinion by the USFWS (for formal consultation) or concurrence by the

USFWS that your activities would be "not likely to adversely affect" listed species or critical habitat (for informal consultation)?
AND
4) Do you agree to implement all measures upon which the consultation was conditioned?
5) Do you agree that if, during the course of the permit term, you plan to install a structural BMP not identified in the NOI that you will re-initiate informal or formal consultation with USFWS as necessary?

Use the guidance below Step 3 to understand effects determination and to answer these questions.

If you answered "Yes" to all four questions above, you have met eligibility USFWS Criteria B. Skip to Step 4.

If you answered "No" to any of the four questions above, go to Step 3.

Step 3 – Determine if You Can Meet Eligibility USFWS Criterion C

USFWS Criterion C: You can certify eligibility according to USFWS Criterion C for coverage by this permit if you answer "Yes" to both of the following question:

1) Does your action area contain one or more of the following species: Northern Long-eared Bat, Sandplain gerardia, Small whorled Pogonia and/or American burying beetle and **does not** contain one any following species: Dwarf wedgemussel, Northeastern bulrush, Piping Plover, Northern Red-bellied cooter, Bog Turtle, Roseate Tern, Puritan tiger beetle, and Northeastern beach tiger beetle?[3]
OR
2) Did the assessment of your discharge and discharge related activities and indicate that there would be "no affect" on listed species or critical habitat and EPA provided concurrence with your determination?
3) Do you agree that if, during the course of the permit term, you plan to install a structural BMP not identified in the NOI that you will to conduct an endangered species screening for the proposed site and contact the USFWS if you determine that the new activity "may affect" or is "not likely to adversely affect" listed species or critical habitat under the jurisdiction of the USFWS.

Use the guidance below to understand effects determination and to answer these questions.

If you answered "Yes" to both the question above, you have met eligibility USFWS Criterion C. Go to Step 4.

If you answered "No" to either of the questions above, you are not eligible for coverage by this permit. You must submit an application for an individual permit for your stormwater discharges. (See 40 CFR 122.21).

USFWS Effects Determination Guidance:

If you are unable to certify eligibility under USFWS Criterion A, you must assess whether your stormwater discharges and discharge-related activities "may affect", will have "no affect" or are "not likely to adversely affect" listed species or critical habitat. "Discharge-related activities" include: activities which cause, contribute to, or result in point source stormwater pollutant discharges; and measures to provide treatment for stormwater discharges including the siting, construction and operational procedures to control, reduce or prevent water pollution. Please be aware that no protection from incidental take liability is provided under this criterion.

The scope of effects to consider will vary with each system. If you are having difficulty in determining whether your system is likely to cause adverse effects to a listed species or critical habitat, you should contact the USFWS for assistance. In order to complete the determination of effects it may be necessary to follow the formal or informal consultation procedures in section 7 of the ESA.

Upon completion of your assessment, document the results of your effects determination. If your results indicate that stormwater discharges or discharge related activities will have "no affect" on threatened or endangered species or critical habitat and EPA concurs with your determination, you are eligible under USFWS Criterion C of this Appendix. Your determination may be based on measures that you implement to avoid, eliminate, or minimized adverse effects.

If the determination is "May affect" or "not likely to adversely affect" you must contact the USFWS to discuss your findings and measures you could implement to avoid, eliminate, or minimize adverse effects. If you and the USFWS reach agreement on measures to avoid adverse effects, you are eligible under USFWS Criterion B. Any terms and/or conditions to protect listed species and critical habitat that you relied on in order to complete an adverse effects determination, must be incorporated into your Storm Water Management Program (required by this permit) and implemented in order to maintain permit eligibility.

If endangered species issues cannot be resolved: If you cannot reach agreement with the USFWS on measures to avoid or eliminate adverse effects then you are not eligible for coverage under this permit. You must seek coverage under an individual permit.

Effects from stormwater discharges and discharge-related activities which could pose an adverse effect include:

- *Hydrological:* Stormwater discharges may cause siltation, sedimentation, or induce other changes in receiving waters such as temperature, salinity or pH. These effects will vary with the amount of stormwater discharged and the volume and condition of the receiving water. Where a discharge constitutes a minute portion of the total volume of the receiving water, adverse hydrological effects are less likely.
- *Habitat:* Excavation, site development, grading and other surface disturbance activities, including the installation or placement of treatment equipment may adversely affect listed species or their habitat. Stormwater from the small MS4 may inundate a listed species habitat.

- *Toxicity:* In some cases, pollutants in the stormwater may have toxic effects on listed species.

Step 4 - Document Results of the Eligibility Determination

Once the USFWS ESA eligibility requirements have been met, you shall include documentation of USFWS ESA eligibility in the Storm Water Management Program required by the permit. Documentation for the various eligibility criteria are as follows:

- USFWS Criterion A: A copy of the IPaC generated preliminary determination letter indicating that no listed species or critical habitat is present within your action area. You shall also include a statement on how you determined that no listed species or critical habitat are in proximity to your stormwater system or discharges.
- USFWS Criterion B: A dated copy of the USFWS letter of concurrence on a finding of “no jeopardy” (for formal consultation) or “not likely to adversely affect” (for informal consultation) regarding the ESA section 7 consultation.
- USFWS Criterion C: A dated copy of the EPA concurrence with the operator’s determination that the stormwater discharges and discharge-related activities will have “no affect” on listed species or critical habitat.

C. Submittal of Notice of Intent

Once the ESA eligibility requirements of Part C of this Appendix have been metyoumay submit the Notice of Intent indicating which Criterion you have met to be eligible for permit coverage. Signature and submittal of the NOI constitutes your certification, under penalty of law, of eligibility for permit coverage under 40 CFR 122.21.

D. Duty to Implement Terms and Conditions upon which Eligibility was Determined

You must comply with any terms and conditions imposed under the ESA eligibility requirements to ensure that your stormwater discharges and discharge related activities do not pose adverse effects or jeopardy to listed species and/or critical habitat. You must incorporate such terms and conditions into your Storm Water Management Program as required by this permit. If the ESA eligibility requirements of this permit cannot be met, then you may not receive coverage under this permit and must apply for an individual permit.

E. Services Information

United States Fish and Wildlife Service Office

National websites for Endangered Species Information:
Endangered Species home page: http://endangered.fws.gov
ESA Section 7 Consultations: http://endangered.fws.gov/consultation/index.html
Information, Planning, and Conservation System (IPAC): http://ecos.fws.gov/ipac/

U.S. FWS – Region 5
Supervisor

New England Field Office
U.S. Fish and Wildlife Services
70 Commercial Street, Suite 300
Concord, NH 03301

Natural Heritage Network

The Natural Heritage Network comprises 75 independent heritage program organizations located in all 50 states, 10 Canadian provinces, and 12 countries and territories located throughout Latin America and the Caribbean. These programs gather, manage, and distribute detailed information about the biological diversity found within their jurisdictions. Developers, businesses, and public agencies use natural heritage information to comply with environmental laws and to improve the environmental sensitivity of economic development projects. Local governments use the information to aid in land use planning.

The Natural Heritage Network is overseen by NatureServe, the Network's parent organization, and is accessible on-line at: http://www.natureserve.org/nhp/us_programs.htm, which provides websites and other access to a large number of specific biodiversity centers.

U.S. Fish and Wildlife IPaC system instructions

Use the following protocol to determine if any federally listed species or designated critical habitats under USFWS jurisdiction exist in your action area:

Enter your project specific information into the “Initial Project Scoping” feature of the Information, Planning, and Conservation (IPaC) system mapping tool, which can be found at the following location:

http://ecos.fws.gov/ipac/

a. Indicate the action area[1] for the MS4 by either:
    a. Drawing the boundary on the map or by uploading a shapefile.
    Select “Continue”

c. Click on the “SEE RESOURCE LIST” button and on the next screen you can export a trust resources list.This will provided a list of natural resources of concern, which will include an Endangered Species Act Species list. You may also request an official species list under “REGULATORY DOCUMENTS” Save copies and retain for your records

[1] The action area is defined by regulation as all areas to be affected directly or indirectly by the action and not merely the immediate area involved in the action (50 CFR §402.02). This analysis is not limited to the "footprint" of the action nor is it limited by the Federal agency's authority. Rather, it is a biological determination of the reach of the proposed action on listed species. Subsequent analyses of the environmental baseline, effects of the action, and levels of incidental take are based upon the action area.

The documentation used by a Federal action agency to initiate consultation should contain a description of the action area as defined in the Services' regulations and explained in the Services' consultation handbook. If the Services determine that the action area as defined by the action agency is incorrect, the Services should discuss their rationale with the agency or applicant, as appropriate. Reaching agreement on the description of the action area is desirable but ultimately the Services can only consult when an action area is defined properly under the regulations.

For storm water discharges or discharge related activities, the action area should encompass the following:

- The immediate vicinity of, or nearby, the point of discharge into receiving waters.
- The path or immediate area through which or over which storm water flows from the municipality to the point of discharge into the receiving water. This includes areas in the receiving water downstream from the point of discharge.
- Areas that may be impacted by construction or repair activities. This extends as far as effects related to noise (from construction equipment, power tools, etc.) and light (if work is performed at night) may reach.

The action area will vary with the size and location of the outfall pipe, the nature and quantity of the storm water discharges, and the type of receiving waters, among other factors.

Attachment B

USFWS New England Field Office
Official Species List for the Town of Winchendon

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
http://www.fws.gov/newengland

In Reply Refer To: April 18, 2019
Consultation Code: 05E1NE00-2019-SLI-1446
Event Code: 05E1NE00-2019-E-03482
Project Name: Winchendon NOI

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

Project Summary

Consultation Code: 05E1NE00-2019-SLI-1446

Event Code: 05E1NE00-2019-E-03482

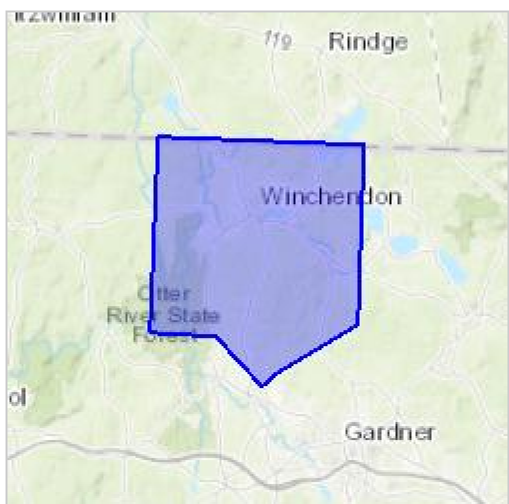
Project Name: Winchendon NOI

Project Type: Regulation Promulgation

Project Description: This project is applying for coverage under the 2016 MS4 General Permit. The project consists of the entire area of the Town of Winchendon's small municipal separate storm sewer systems (MS4) that falls within the urbanized area of the town. Based on EPA's 2016 MS4 General Permit, Winchendon must apply for permit coverage for the Town's MS4 stormwater discharges and assess the impacts of the stormwater discharges and discharge-related activities on endangered and threatened species, and designated critical habitats that fall within the areas that fall within the
MS4.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/42.65943730437019N72.04939524849136W



Counties: Worcester, MA | Cheshire, NH

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Attachment C

Federally Listed Endangered and Threatened Species in Massachusetts

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Barnstable	Piping Plover	Threatened	Coastal Beaches	All Towns
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	All Towns
	Northeastern beach tiger beetle	Threatened	Coastal Beaches	Chatham
	Sandplain gerardia	Endangered	Open areas with sandy soils.	Sandwich and Falmouth.
	Northern Red-bellied Cooter	Endangered	Inland Ponds and Rivers	Bourne (north of the Cape Cod Canal)
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Berkshire	Bog Turtle	Threatened	Wetlands	Egremont and Sheffield
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Bristol	Piping Plover	Threatened	Coastal Beaches	Fairhaven, Dartmouth, Westport
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	Fairhaven, New Bedford, Dartmouth, Westport
	Northern Red-bellied Cooter	Endangered	Inland Ponds and Rivers	Taunton
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Dukes	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	All Towns
	Piping Plover	Threatened	Coastal Beaches	All Towns
	Northeastern beach tiger beetle	Threatened	Coastal Beaches	Aquinnah and Chilmark
	Sandplain gerardia	Endangered	Open areas with sandy soils.	West Tisbury
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide

Updated 02/05/2016

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Essex	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Gloucester, Essex and Manchester
	Piping Plover	Threatened	Coastal Beaches	Gloucester, Essex, Ipswich, Rowley, Revere, Newbury, Newburyport and Salisbury
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Franklin	Northeastern bulrush	Endangered	Wetlands	Montague, Warwick
	Dwarf wedgemussel	Endangered	Mill River	Whately
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Hampshire	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Hadley
	Puritan tiger beetle	Threatened	Sandy beaches along the Connecticut River	Northampton and Hadley
	Dwarf wedgemussel	Endangered	Rivers and Streams.	Hatfield, Amherst and Northampton
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Hampden	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Southwick
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Middlesex	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Groton
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Nantucket	Piping Plover	Threatened	Coastal Beaches	Nantucket
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	Nantucket
	American burying beetle	Endangered	Upland grassy meadows	Nantucket
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide

Updated 02/05/2016

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Plymouth	Piping Plover	Threatened	Coastal Beaches	Scituate, Marshfield, Duxbury, Plymouth, Wareham and Mattapoisett
	Northern Red-bellied Cooter	Endangered	Inland Ponds and Rivers	Kingston, Middleborough, Carver, Plymouth, Bourne, Wareham, Halifax, and Pembroke
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	Plymouth, Marion, Wareham, and Mattapoisett.
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Suffolk	Piping Plover	Threatened	Coastal Beaches	Revere, Winthrop
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Worcester	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Leominster
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide

[1]Migratory only, scattered along the coast in small numbers

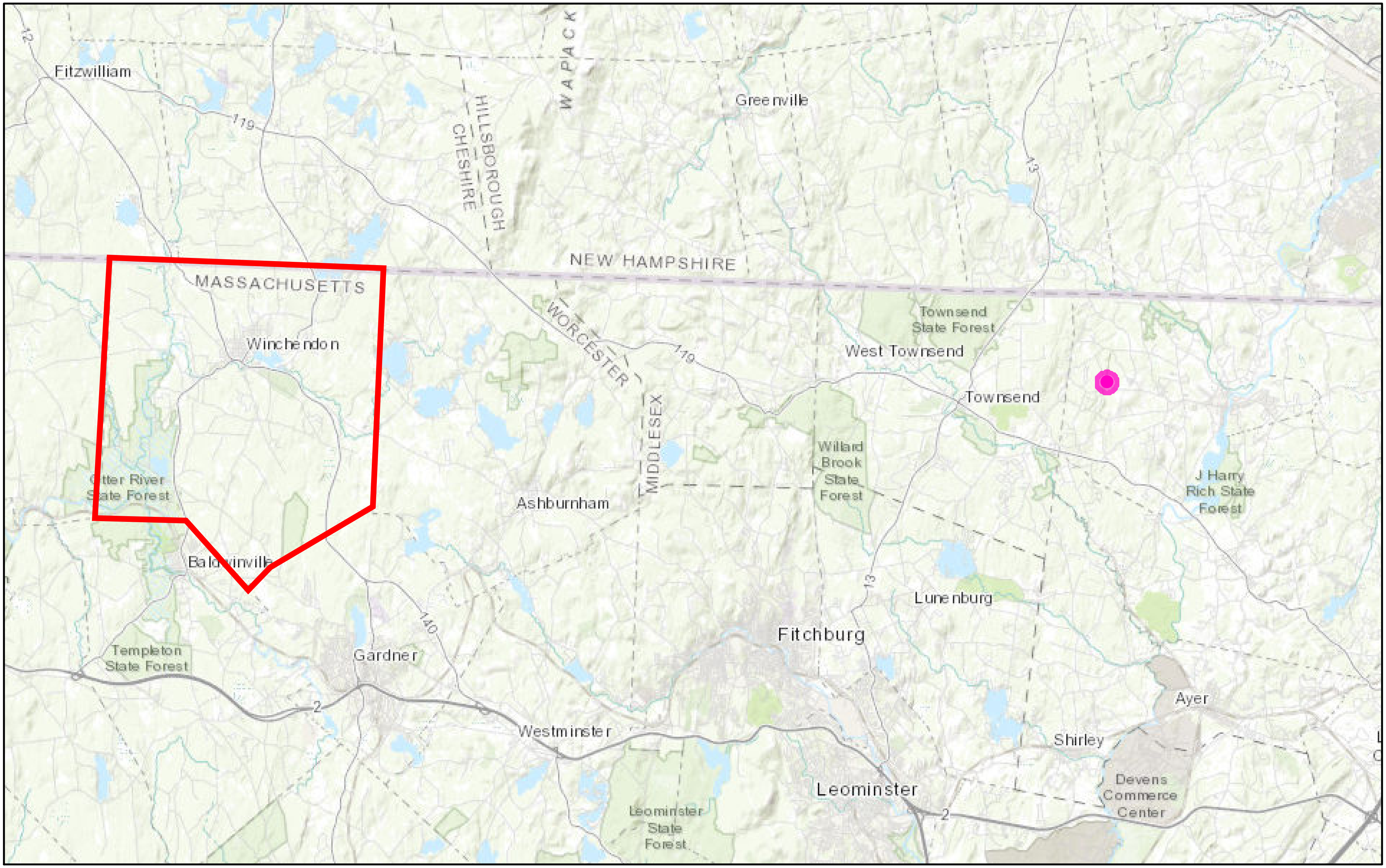
-Eastern cougar and gray wolf are considered extirpated in Massachusetts.
-Endangered gray wolves are not known to be present in Massachusetts, but dispersing individuals from source populations in Canada may occur statewide.
-Critical habitat for the Northern Red-bellied Cooter is present in Plymouth County.

Updated 02/05/2016

Attachment D

NHESP Northern Long-eared Bat Hibernacula Map

Northern Long-Eared Bat Locations



September 14, 2018

Statewide NLEB Symbology

Hibernaculum

MA Northern Long-eared Bat Winter Hibernacula (with ¼ mile buffer)

1:288,895

0 1.75 3.5 7 mi

0 2.75 5.5 11 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

Attachment E

USFWS New England Field Office Review Letter

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5087
http://www.fws.gov/newengland

January 31, 2019

To Whom It May Concern:

This project was reviewed for the presence of federally listed or proposed, threatened or endangered species or critical habitat per instructions provided on the U.S. Fish and Wildlife Service's New England Field Office website:

http://www.fws.gov/newengland/EndangeredSpec-Consultation.htm (accessed January 2019)

Based on information currently available to us, no federally listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area(s). Preparation of a Biological Assessment or further consultation with us under section 7 of the Endangered Species Act is not required. No further Endangered Species Act coordination is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

Thank you for your cooperation. Please contact David Simmons of this office at 603-227-6425 if we can be of further assistance.

Sincerely yours,

Thomas R. Chapman
Supervisor
New England Field Office

Appendix D

Historic Properties Eligibility Criteria Documentation

National Historic Preservation Act Eligibility Certification

TO: Town of Winchendon Stormwater Program Files

FROM: Tighe & Bond

COPY: Al Gallant, DPW Director
Keith R. Hickey, Town Manager

DATE: April 18, 2019

Tighe & Bond has completed the National Historic Preservation Act Eligibility Determination screening process in accordance with Part 1.9.2 and Appendix D of U.S. EPA's National Pollutant Discharge Elimination System (NPDES) General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) in Massachusetts (see Attachment A of this memorandum), effective July 1, 2018, and determined that the **Town of Winchendon** meets **Criterion A**, where the discharges do not have the potential to cause effects on historic properties.

Tighe & Bond followed the screening process included in Appendix D and has determined Winchendon is a new facility and therefore meets Criterion A (see Question 1 in Appendix D of the Permit) and is not, as part of developing and submitting the Notice of Intent for permit coverage, undertaking any activity involving subsurface land disturbance less than an acre.

Based on this screening process, the Town of Winchendon's stormwater discharges, allowable non-stormwater discharges, and stormwater discharge-related activities will not have an effect on a property that is listed or eligible for listing on the National Register of Historic Properties (NRHP) and no further action is necessary at this time.

Attachment B to this memorandum includes a list of the National Register of Historic Places listings in Winchendon that is current as of April 4, 2019, and a list of federal- and state-listed historic areas, buildings, burial grounds, objects, and structures in Winchendon downloaded from the Massachusetts Cultural Resource Information System (MACRIS) that is current as of April 18, 2019.

If the Town undertakes construction on or around a property that is listed or eligible for listing, the Town will coordinate with the State Historic Preservation Officer (SHPO) (i.e. the Massachusetts Historical Commission) by submitting a Project Notification Form and associated documentation for the project. As applicable for each project, the Town will implement measures to avoid or minimize adverse impacts on places listed, or eligible for listing, on the NRHP, including any conditions imposed by the SHPO or THPO. If the Town fails to document and implement such measures, those discharges are ineligible for coverage under EPA's Small MS4 General Permit.

\\tighebond.com\data\Data\Projects\W\W1157 Winchendon\050 NPDES Small MS4 GP NOI\NOI\Supplemental Docs\HP Cert\Revised HP Cert.docx

Attachment A

Excerpts from EPA’s NPDES General Permits for Stormwater Discharges from Small MS4s in Massachusetts

Appendix D – Procedures Relating to Historic Properties Preservation

Appendix D
National Historic Preservation Act Guidance

Background

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to take into account the effects of Federal "undertakings" on historic properties that are either listed on, or eligible for listing on, the National Register of Historic Places. The term federal "undertaking" is defined in the NHPA regulations to include a project, activity, or program of a federal agency including those carried out by or on behalf of a federal agency, those carried out with federal financial assistance, and those requiring a federal permit, license or approval. See 36 CFR 800.16(y). Historic properties are defined in the NHPA regulations to include prehistoric or historic districts, sites, buildings, structures, or objects that are included in, or are eligible for inclusion in, the National Register of Historic Places. This term includes artifacts, records, and remains that are related to and located within such properties. See 36 CFR 800.16(1).

EPA's issuance of a National Pollutant Discharge Elimination System (NPDES) General Permit is a federal undertaking within the meaning of the NHPA regulations and EPA has determined that the activities to be carried out under the general permit require review and consideration, in order to be in compliance with the federal historic preservation laws and regulations. Although individual submissions for authorization under the general permit do not constitute separate federal undertakings, the screening processes provides an appropriate site-specific means of addressing historic property issues in connection with EPA's issuance of the permit. To address any issues relating to historic properties in connection with the issuance of this permit, EPA has included a screening process for applicants to identify whether properties listed or eligible for listing on the National Register of Historic Places are within the path of their discharges or discharge-related activities (including treatment systems or any BMPs relating to the discharge or treatment process) covered by this permit.

Applicants seeking authorization under this general permit must comply with applicable, State, Tribal, and local laws concerning the protection of historic properties and places and may be required to coordinate with the State Historic Preservation Officer (SHPO) and/or Tribal Historic Preservation Officer (THPO) and others regarding effects of their discharges on historic properties.

Activities with No Potential to Have an Effect on Historic Properties

A determination that a federal undertaking has no potential to have an effect on historic properties fulfills an agency's obligations under NHPA. EPA has reason to believe that the vast majority of activities authorized under this general permit will have no potential effects on historic properties. This permit typically authorizes discharges from existing facilities and requires control of the pollutants discharged from the facility. EPA does not anticipate effects on historic properties from the pollutants in the authorized discharges. Thus, to the extent EPA's issuance of this general permit authorizes discharges of such constituents, confined to existing channels, outfalls or natural drainage areas, the permitting action does not have the potential to cause effects on historical properties.

In addition, the overwhelming majority of sources covered under this permit will be facilities that are seeking renewal of previous permit authorization. These existing dischargers should have already addressed NHPA issues in the previous general permit as they were required to certify that they were either not affecting historic properties or they had obtained written agreement from the applicable SHPO or THPO regarding methods of mitigating potential impacts. To the extent this permit authorizes renewal of prior coverage without relevant changes in operations the discharge has no potential to have an effect on historic properties.

Activities with Potential to Have an Effect on Historic Properties

EPA believes this permit may have some potential to have an effect on historic properties the applicant undertakes the construction and/or installation of control measures that involve subsurface disturbance that involves less than 1 acre of land. (Ground disturbances of 1 acre or more require coverage under the Construction General Permit.) Where there is disturbance of land through the construction and/or installation of control measures, there is a possibility that artifacts, records, or remains associated with historic properties could be impacted. Therefore, if the applicant is establishing new or altering existing control measures to manage their discharge that will involve subsurface ground disturbance of less than 1 acre, they will need to ensure (1) that historic properties will not be impacted by their activities or (2) that they are in compliance with a written agreement with the SHPO, THPO, or other tribal representative that outlines all measures the applicant will carry out to mitigate or prevent any adverse effects on historic properties.

Examples of Control Measures Which Involve Subsurface Disturbance

The type of control measures that are presumptively expected to cause subsurface ground disturbance include:

- Dikes
- Berms
- Catch basins, drainage inlets
- Ponds, bioretention areas
- Ditches, trenches, channels, swales
- Culverts, pipes
- Land manipulation; contouring, sloping, and grading
- Perimeter Drains
- Installation of manufactured treatment devices

EPA cautions applicants that this list is non-inclusive. Other control measures that involve earth disturbing activities that are not on this list must also be examined for the potential to affect historic properties.

Certification

Upon completion of this screening process the applicant shall certify eligibility for this permit using one of the following criteria on their Notice of Intent for permit coverage:

> **Criterion A**: The discharges do not have the potential to cause effects on historic properties.

Criterion B: A historic survey was conducted. The survey concluded that no historic properties are present. Discharges do not have the potential to cause effects on historic properties.

Criterion C: The discharges and discharge related activities have the potential to have an effect on historic properties, and the applicant has obtained and is in compliance with a written agreement with the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (TPHO), or other tribal representative that outlines measures the applicant will carry out to mitigate or prevent any adverse effects on historic properties.

Authorization under the general permit is available only if the applicant certifies and documents permit eligibility using one of the eligibility criteria listed above. Small MS4s that cannot meet any of the eligibility criteria in above must apply for an individual permit.

Screening Process

Applicants or their consultant need to answer the questions and follow the appropriate procedures below to assist EPA in compliance with 36 CFR 800.

Question 1*:* Is the facility an existing facility authorized by the previous permit or a new facility and the applicant is not undertaking any activity involving subsurface land disturbance less than an acre?

YES - The applicant should certify that fact in writing and file the statement with the EPA. This certification must be maintained as part of the records associated with the permit.
The applicant should certify eligibility for this permit using Criterion A on their Notice of Intent for permit coverage. The applicant does not need to contact the state Historic Commission. Based on that statement, EPA will document that the project has "no potential to cause effects" (36 CFR 800.3(a)(1)). There are no further obligations under the Section 106 regulations.

NO- Go to Question 2.

Question 2*:* Is the property listed in the National Register of Historic Places or have prior surveys or disturbances revealed the existence of a historic property or artifacts?

NO - The applicant should certify that fact in writing and file the statement with the EPA. This certification must be maintained as part of the records associated with the permit.
The applicant should certify eligibility for this permit using Criterion B on their Notice of Intent for permit coverage. The applicant does not need to contact the state Historic Commission. Based on that statement, EPA will document that the project has "no potential to cause effects" (36 CFR 800.3(a)(1)). There are no further obligations under the Section 106 regulations.

YES - The applicant or their consultant should prepare a complete information submittal to the SHPO. The submittal consists of:

- Completed Project Notification Form- forms available at http://www.sec.state.ma.us/mhc/mhcform/formidx.htm;

- USGS map section with the actual project boundaries clearly indicated; and
- Scaled project plans showing existing and proposed conditions.

(1) Please note that the SHPO does not accept email for review. Please mail a paper copy of your submittal (Certified Mail, Return Receipt Requested) or deliver a paper copy of your submittal (and obtain a receipt) to:

State Historic Preservation Officer
Massachusetts Historical Commission
220 Morrissey Blvd.
Boston MA 02125.

(2) Provide a copy of your submittal and the proof of MHC delivery showing the date MHC received your submittal to:

NPDES Permit Branch Chief
US EPA Region 1 (OEP06-1)
5 Post Office Square, Suite 100
Boston MA 02109-3912.

The SHPO will comment within thirty (30) days of receipt of complete submittals, and may ask for additional information. Consultation, as appropriate, will include EPA, the SHPO and other consulting parties (which includes the applicant). The steps in the federal regulations (36 CFR 800.2 to 800.6, etc.) will proceed as necessary to conclude the Section 106 review for the undertaking. **The applicant should certify eligibility for this permit using Criterion C on their Notice of Intent for permit coverage.**

Attachment B

Excerpts from National Register Listings for Massachusetts

MACRIS List of Federal- and State-Listed Historic Areas, Buildings, Burial Grounds, Objects, and Structures in the Town of Winchendon

National Register of Historic Places Listed Properties as of 4/4/2019 (https://www.nps.gov/subjects/nationalregister/database-research.htm)

Ref#	Property Name	Status	State	County	City	Street & Number	Listed Date	Other Names
87002562	Murdock School	Listed	MASSACHUSETTS	Worcester	Winchendon	Murdock Ave.	1/28/1988	Old Murdock High School
87000901	Old Centre Historic District	Listed	MASSACHUSETTS	Worcester	Winchendon	Roughly Old County and Baldwinsville Rds., Hale St., and Teel Rd.	9/18/1987	
92000056	Winchendon Village Historic District	Listed	MASSACHUSETTS	Worcester	Winchendon	Roughly, N side Central St. from Summer to Front Sts. and N side Front from Academy to Spring Sts.	9/1/1993	

MACRIS Search Results

Search Criteria: Town(s): Winchendon; Resource Type(s): Area, Building, Burial Ground, Object, Structure;

Inv. No.	Property Name	Street	Town	Year
WIN.A	Old Centre Historic District		Winchendon	
WIN.B	Winchendon Town Center		Winchendon	
WIN.C	Upper Front - Lower West Streets Area		Winchendon	
WIN.D	School Street Area		Winchendon	
WIN.E	Lincoln Avenue - Pleasant Street Area		Winchendon	
WIN.F	Pearl, Mill and Spruce Streets Area		Winchendon	
WIN.G	Lower Central Street Area		Winchendon	
WIN.H	Chestnut and Walnut Streets Area		Winchendon	
WIN.I	Linden and Maple Streets Area		Winchendon	
WIN.J	Upper Central Street Area		Winchendon	
WIN.K	Franklin, Jackson and Juniper Streets Area		Winchendon	
WIN.L	Lincoln Avenue Extension Area		Winchendon	
WIN.M	Winter and East Streets Area		Winchendon	
WIN.N	Prospect and High Streets Area		Winchendon	
WIN.O	Spring - Ash Streets Area		Winchendon	
WIN.P	Spring Village		Winchendon	
WIN.Q	Glenallen		Winchendon	
WIN.R	Centerville		Winchendon	
WIN.S	Waterville		Winchendon	
WIN.T	Hydeville		Winchendon	
WIN.U	Bullardville		Winchendon	
WIN.V	Robbinsville - Harrisville		Winchendon	
WIN.W	Pequiog		Winchendon	
WIN.X	New Boston		Winchendon	
WIN.Y	Winchendon Center Historic District		Winchendon	
WIN.Z	Winchendon Village Historic District		Winchendon	
WIN.AA	Otter River State Forest - Beaman Pond Area		Winchendon	

Inv. No.	Property Name	Street	Town	Year
WIN.AB	Otter River Road Area		Winchendon	
WIN.67	Spear, Asahel O. House	16 Academy St	Winchendon	c 1896
WIN.358	Ward, Franklin W. House	26 Academy St	Winchendon	1872
WIN.359	Davis, P. S. House	44 Academy St	Winchendon	c 1850
WIN.337		700 Alger St	Winchendon	c 1880
WIN.336	Bruce, Josiah House	857 Alger St	Winchendon	c 1820
WIN.255	Marvin School	Ash St	Winchendon	1903
WIN.257	Stearns, Asa House	Ash St	Winchendon	c 1770
WIN.254	Mason and Parker Manufacturing Worker Housing	27-29 Ash St	Winchendon	1924
WIN.379	McCabe, Morton House	32 Ash St	Winchendon	1860
WIN.380	Dray, John House	62 Ash St	Winchendon	c 1830
WIN.256	Cleary, John House	88 Ash St	Winchendon	r 1850
WIN.258	Toy Town Tavern	178 Ash St	Winchendon	1786
WIN.259	Stearns House	202 Ash St	Winchendon	1780
WIN.397	Lufkin, Isaac House	Baldwinville Rd	Winchendon	c 1830
WIN.800	Boston Cemetery, New	Beaman Pond Rd	Winchendon	1791
WIN.366	Roby House	29 Beech St	Winchendon	c 1860
WIN.138	Withington, Amos House	37-39 Beech St	Winchendon	c 1840
WIN.139	Pollard, W. House	41 Beech St	Winchendon	c 1870
WIN.140	Lynch, James C. House	53 Beech St	Winchendon	c 1860
WIN.207		12-14 Belmont Ave	Winchendon	1928
WIN.208	Damon, Donald House	52 Belmont Ave	Winchendon	1909
WIN.209	Morlock, Edward House	62 Belmont Ave	Winchendon	1909
WIN.210	L'Etoile, Joseph House	66 Belmont Ave	Winchendon	1909
WIN.308	Sibley Store	5 Benjamin St	Winchendon	1882
WIN.309	Murdock, Elisha and Company Worker Housing	14 Benjamin St	Winchendon	c 1830
WIN.310		17-19 Benjamin St	Winchendon	c 1825
WIN.311	Rich, Milo House	49 Benjamin St	Winchendon	1875
WIN.312	Murdock, Elisha and Company Worker Housing	105 Benjamin St	Winchendon	c 1900
WIN.400	Brooks, John Allen House	Bosworth Rd	Winchendon	c 1810
WIN.401	Weston House	Bosworth Rd	Winchendon	c 1850
WIN.193	Brown, William and Sons Worker Housing	5-6 Brown Ave	Winchendon	1903
WIN.194	Brown, William and Sons Worker Housing	7-8 Brown Ave	Winchendon	1903
WIN.195	Brown, William and Sons Worker Housing	9-10 Brown Ave	Winchendon	1903
WIN.306	Woodcock and Sawyer Mills	1 Brown St	Winchendon	c 1860
WIN.323	Gordon, Exist House	111 Brown St	Winchendon	c 1896
WIN.374	Winchendon Baptist Church	Central St	Winchendon	1848

Inv. No.	Property Name	Street	Town	Year
WIN.399	Beaman Farm Barn	Central St	Winchendon	
WIN.409	WINQ Radio Station	3 Central St	Winchendon	c 1980
WIN.121	Joseph's Block	22-24 Central St	Winchendon	c 1880
WIN.122	Fairbanks, Sidney House	32 Central St	Winchendon	c 1853
WIN.413		40-44 Central St	Winchendon	r 1850
WIN.123	A & P Block	48-60 Central St	Winchendon	1927
WIN.414		62-68 Central St	Winchendon	c 1930
WIN.124	Greenwood's Block	73-77 Central St	Winchendon	r 1850
WIN.125	Artisan Block	78-86 Central St	Winchendon	1908
WIN.126	Merrill's Block	87-91 Central St	Winchendon	1906
WIN.363	Fairbanks, Calista House	103 Central St	Winchendon	c 1850
WIN.127	Winchendon Savings Bank	112-114 Central St	Winchendon	1929
WIN.128	Church of the Unity	126 Central St	Winchendon	1866
WIN.129	Clark, Wendell P. Memorial	155 Central St	Winchendon	1954
WIN.130	U. S. Post Office - Winchendon Main Branch	160 Central St	Winchendon	1941
WIN.131	Telephone Building	172 Central St	Winchendon	1930
WIN.132	Adams Block	184-188 Central St	Winchendon	1923
WIN.133	Rome Block	212-220 Central St	Winchendon	r 1903
WIN.158	Tucker, Seth House	321 Central St	Winchendon	c 1830
WIN.159	Bennett, Charles N. House	346 Central St	Winchendon	c 1892
WIN.160	Putney, Leon D. House	356 Central St	Winchendon	c 1850
WIN.161	Trussell, Olive House	366 Central St	Winchendon	r 1878
WIN.162	Taylor, George House	367 Central St	Winchendon	1901
WIN.163	Sargent, Daniel Harris House	383 Central St	Winchendon	c 1895
WIN.164	Ball, Frederick E. House	390 Central St	Winchendon	1890
WIN.165	Riley, Andrew House	413 Central St	Winchendon	1894
WIN.166	Brown, William House	420 Central St	Winchendon	c 1909
WIN.167	Parke, William C. House	425-427 Central St	Winchendon	c 1898
WIN.168	Boyce, Walter House	442 Central St	Winchendon	1914
WIN.169	Mann, Frank House	448 Central St	Winchendon	1916
WIN.170	Jones, James A. House	453 Central St	Winchendon	1902
WIN.171	Maynard, Louis House	464 Central St	Winchendon	1925
WIN.172	LaPlante, Stanislas House	474 Central St	Winchendon	1931
WIN.173	Sargent, Eaton D. House	518 Central St	Winchendon	1907
WIN.174	McCarthy, Eugene O. House	528 Central St	Winchendon	1908
WIN.175	Poland, Wheeler House	547 Central St	Winchendon	c 1886
WIN.176	Goodspeed, Isaac House	573 Central St	Winchendon	r 1840
WIN.134	Engine House	19 Chestnut St	Winchendon	r 1840

Inv. No.	Property Name	Street	Town	Year
WIN.364	Cutler, John C. House	23 Chestnut St	Winchendon	c 1844
WIN.365	Parker, Gilman B. House	26 Chestnut St	Winchendon	c 1830
WIN.135	Stearns, Gilbert F. House	27 Chestnut St	Winchendon	r 1845
WIN.136	Morrill, David L. House	32 Chestnut St	Winchendon	c 1840
WIN.137	Roddey, John - Walker, Hiram House	33 Chestnut St	Winchendon	r 1865
WIN.63	Evans, Oscar H. House	22-24 Court St	Winchendon	1892
WIN.64	Loud's Row	38-40 Court St	Winchendon	c 1870
WIN.65	Loud's Row	44-46 Court St	Winchendon	c 1870
WIN.66	Loud's Row	50-52 Court St	Winchendon	c 1870
WIN.393	Whitney, Hananiah House	Crosby Rd	Winchendon	c 1830
WIN.396	Herrick Farm	Doyle Ave	Winchendon	c 1860
WIN.197	Bump, Christopher C. House	11 East St	Winchendon	1893
WIN.198	Bump, Charles R. House	14 East St	Winchendon	1898
WIN.199	Parks, Albert E. House	40 East St	Winchendon	1899
WIN.154	Betterly, Orland House	116 Elm St	Winchendon	1868
WIN.155	Chandler, Marshall W. House	130 Elm St	Winchendon	1863
WIN.388	White Stables	Elmwood Rd	Winchendon	1924
WIN.331	Morlock, William E. House	23 Elmwood Rd	Winchendon	c 1899
WIN.332	Girouard, Stanislas House	51 Elmwood Rd	Winchendon	c 1899
WIN.390	Murdock Dairy Farm	62 Elmwood Rd	Winchendon	c 1830
WIN.389	Captain's Farm	106 Elmwood Rd	Winchendon	r 1765
WIN.297	Morlock, Peter A. House	382 Elmwood Rd	Winchendon	c 1885
WIN.251	Harriman, James House	50 Emerald St	Winchendon	c 1860
WIN.252	Harriman, Daniel House	58 Emerald St	Winchendon	c 1880
WIN.240	Winchendon Country Club	Fairbank St	Winchendon	c 1901
WIN.239	Whitney, William W. House	16 Fairbank St	Winchendon	1926
WIN.190	Morton E. Converse and Son, Inc.	Franklin St	Winchendon	c 1900
WIN.4	North Congregational Church	Front St	Winchendon	1844
WIN.904	World War II, Korean and Vietnam Memorial	Front St	Winchendon	1984
WIN.907	Toy Town Rocking Horse	Front St	Winchendon	1988
WIN.913	American Legion Park	Front St	Winchendon	1922
WIN.914	Winchendon World War I Monument	Front St	Winchendon	1922
WIN.915	World War I Monument Honor Roll	Front St	Winchendon	c 1922
WIN.916	American Legion Park Flagpole	Front St	Winchendon	c 1984
WIN.917	Civil War Cannon	Front St	Winchendon	c 1861
WIN.918	World War I Cannon	Front St	Winchendon	c 1914
WIN.1	Whitcomb, Mark House	4 Front St	Winchendon	c 1830
WIN.356	Pearsons, Bartholomew House	19 Front St	Winchendon	1760

Inv. No.	Property Name	Street	Town	Year
WIN.3	Mason and Parker Manufacturing Company	28 Front St	Winchendon	r 1878
WIN.2		30 Front St	Winchendon	r 1846
WIN.357	Bancroft House	39 Front St	Winchendon	c 1830
WIN.5	Pollard Block	68 Front St	Winchendon	c 1840
WIN.6	Bank Building	74 Front St	Winchendon	1866
WIN.410		86 Front St	Winchendon	r 1895
WIN.415	Cumberland Farms Food Stores	95 Front St	Winchendon	c 1935
WIN.7	Murdock, I. M. Building	98 Front St	Winchendon	1878
WIN.412	Old Travelor's Restaurant	102 Front St	Winchendon	c 1830
WIN.8	Winchendon Post Office Building	106 Front St	Winchendon	1858
WIN.9	Winchendon Town Hall	109 Front St	Winchendon	1850
WIN.10	Murdock Trustees Building	110 Front St	Winchendon	c 1850
WIN.11	Morse, Isaac House	135 Front St	Winchendon	1790
WIN.12	Whitney, Elisha House	151 Front St	Winchendon	r 1825
WIN.13	Whitney, Amasa Jr. - Whitney, Mary Murdock House	165 Front St	Winchendon	1791
WIN.14	Murdock, Ephraim - Beals, Charles House	179 Front St	Winchendon	1800
WIN.15	Godding, Dr. Alvah House	193 Front St	Winchendon	1841
WIN.17	Scott, Samuel M. House	216-218 Front St	Winchendon	1868
WIN.18		220-222 Front St	Winchendon	r 1896
WIN.19	Brooks, William A. House	254 Front St	Winchendon	r 1845
WIN.20	Poland, Wheeler House	260 Front St	Winchendon	r 1845
WIN.21	Poland, Stephen House	263-267 Front St	Winchendon	r 1845
WIN.22	Methodist Parsonage	269 Front St	Winchendon	c 1834
WIN.23	Tolman, Charles House	277 Front St	Winchendon	c 1830
WIN.24	Robbins, Joseph A. House	287 Front St	Winchendon	r 1845
WIN.25	Hyde, Job and Joel House	295-299 Front St	Winchendon	c 1830
WIN.26	Partridge, Henry F. House	300 Front St	Winchendon	c 1870
WIN.27	McDonald, James M. House	332 Front St	Winchendon	1891
WIN.28	Robbins, James H. House	333 Front St	Winchendon	c 1868
WIN.29	Townsend, James H. House	347 Front St	Winchendon	1872
WIN.30	Todd, Elisha House	348-350 Front St	Winchendon	1868
WIN.31	Cote, Eugene House	374 Front St	Winchendon	c 1901
WIN.32	Johnson, Michael House	380 Front St	Winchendon	c 1909
WIN.33	Brothers, Moses House	404 Front St	Winchendon	c 1905
WIN.329	Raymond House	115 Gardner Rd	Winchendon	r 1800
WIN.328	Woodbury Farm	156 Gardner Rd	Winchendon	c 1790
WIN.272	White School	134 Glenallan St	Winchendon	1886

Inv. No.	Property Name	Street	Town	Year
WIN.273	White, N. D. and Sons Worker Housing	140 Glenallan St	Winchendon	r 1850
WIN.274	Norcross, Silas Stow House	166 Glenallan St	Winchendon	r 1850
WIN.275	White, N. D. and Sons Worker Housing	173 Glenallan St	Winchendon	r 1850
WIN.276		176 Glenallan St	Winchendon	r 1878
WIN.277	White, N. D. and Sons Worker Housing	178-80 Glenallan St	Winchendon	r 1850
WIN.278	Spaulding, Seth B. House	181 Glenallan St	Winchendon	r 1850
WIN.279	Tolman Tavern	192 Glenallan St	Winchendon	c 1850
WIN.405		231 Glenallan St	Winchendon	
WIN.268	Glenallen Mill	Glenallen St	Winchendon	1886
WIN.381	Glenallen Mill - Weave Shed	Glenallen St	Winchendon	1909
WIN.801	Riverside Cemetery	Glenallen St	Winchendon	c 1858
WIN.802	Calvary Cemetery	Glenallen St	Winchendon	c 1871
WIN.261	White, N. D. and Sons Worker Housing	30-32 Glenallen St	Winchendon	c 1830
WIN.262	White, N. D. and Sons Worker Housing	34-36 Glenallen St	Winchendon	c 1830
WIN.263	White, N. D. and Sons Worker Housing	42 Glenallen St	Winchendon	c 1830
WIN.264	White, N. D. and Sons Worker Housing	44 Glenallen St	Winchendon	c 1830
WIN.265	White, N. D. and Sons Worker Housing	48 Glenallen St	Winchendon	c 1830
WIN.266	White, N. D. and Sons Worker Housing	50 Glenallen St	Winchendon	
WIN.267	White, N. D. and Sons Boarding House	52 Glenallen St	Winchendon	c 1831
WIN.269		65 Glenallen St	Winchendon	r 1890
WIN.270	Morlock, Charles H. House	71 Glenallen St	Winchendon	c 1900
WIN.271		126 Glenallen St	Winchendon	c 1830
WIN.280	McColley, John S. House	196 Glenallen St	Winchendon	r 1850
WIN.294	White, N. D. and Sons Worker Housing	201 Glenallen St	Winchendon	c 1830
WIN.281	Winchendon District School #4	221 Glenallen St	Winchendon	c 1858
WIN.282	Rock Cottage	224 Glenallen St	Winchendon	c 1869
WIN.283	Capron, C. B. House	226 Glenallen St	Winchendon	r 1851
WIN.383		229 Glenallen St	Winchendon	c 1900
WIN.97	Haven, Sumner House	48 Grove St	Winchendon	1894
WIN.98	Norcross, Charles H. House	53 Grove St	Winchendon	c 1864
WIN.99	Ketchum, Stephen C. House	54 Grove St	Winchendon	1868
WIN.362	Howard, J. D. House	67 Grove St	Winchendon	c 1852
WIN.100	McIntosh, Peter House	94 Grove St	Winchendon	c 1909
WIN.73	Carroll, Willard A. House	149 Grove St	Winchendon	1896
WIN.74	Wright, Benjamin House	155 Grove St	Winchendon	c 1892
WIN.322	District School	75 Hale St	Winchendon	c 1850
WIN.334		270 Hale St	Winchendon	c 1825
WIN.391	Brown, Benjamin House	298 Hale St	Winchendon	c 1830

Inv. No.	Property Name	Street	Town	Year
WIN.335		400 Hale St	Winchendon	c 1860
WIN.803	Centre Cemetery, Old	Hall Rd	Winchendon	c 1771
WIN.355	Adams, Joseph House	160 Hall Rd	Winchendon	1802
WIN.327	Taylor, James Farm	Harris Rd	Winchendon	c 1830
WIN.227	Mapleview	12 High St	Winchendon	c 1883
WIN.228	Parker, Homer House	17 High St	Winchendon	c 1910
WIN.229	Whitcomb, Calvin R. House	19 High St	Winchendon	1843
WIN.230		24 High St	Winchendon	1812
WIN.231	Maybery, Henry M. House	46 High St	Winchendon	c 1898
WIN.232	Cobb, Lither House	47 High St	Winchendon	c 1875
WIN.233	Gordan, William A. House	60 High St	Winchendon	1902
WIN.234	Whitney, Washington House	61 High St	Winchendon	c 1865
WIN.235	Hayward, Henry W. House	88 High St	Winchendon	1913
WIN.236	Murdock, Clark M. House	108 High St	Winchendon	1898
WIN.237	Wyman, Horace H. House	118 High St	Winchendon	c 1865
WIN.238	Russell, Ira House	123 High St	Winchendon	r 1876
WIN.403	Wilder, Gardner House	170 High St	Winchendon	c 1831
WIN.241	Adams, Col. Oliver House	177 High St	Winchendon	r 1840
WIN.242	Nichols, Levi Tavern	271 High St	Winchendon	c 1773
WIN.211	Buckminster, Joseph A. House	37 Highland St	Winchendon	c 1886
WIN.212	Simoneau, Napolean House	38 Highland St	Winchendon	1925
WIN.213	Knight, Hosea B. House	47 Highland St	Winchendon	c 1872
WIN.307	Murdock, Elisha and Company Worker Housing	40 Hill St	Winchendon	c 1850
WIN.398	Evans, Jonathon House	Hitchcock Rd	Winchendon	c 1830
WIN.38	Holman, Elnor House	25 Hyde Park St	Winchendon	1909
WIN.39	Wheeler, George E. House	29 Hyde Park St	Winchendon	c 1909
WIN.40	Cummings, Sylvester I. House	30 Hyde Park St	Winchendon	1911
WIN.185	O'Brien House	10 Jackson Ave	Winchendon	c 1902
WIN.186	Bernard, George House	14 Jackson Ave	Winchendon	1907
WIN.187	Breton, Ernest House	19 Jackson Ave	Winchendon	1906
WIN.188	Breton, Ernest House	21 Jackson Ave	Winchendon	1906
WIN.189	Caouette, Louis House	37-39 Jackson Ave	Winchendon	c 1908
WIN.181		53 Juniper St	Winchendon	c 1906
WIN.182	Conner, Daniel House	67 Juniper St	Winchendon	r 1840
WIN.183	Forrestall, Boswell E. House	77-79 Juniper St	Winchendon	1871
WIN.184		83 Juniper St	Winchendon	1907
WIN.191	Brown, William and Sons	Lincoln Ave	Winchendon	c 1901
WIN.76	Whitney, Ida F. House	23 Lincoln Ave	Winchendon	1927

Inv. No.	Property Name	Street	Town	Year
WIN.77	Whitney, William House	36 Lincoln Ave	Winchendon	1929
WIN.78	Methodist Church Parsonage	66 Lincoln Ave	Winchendon	r 1892
WIN.79	Raymond, Lyman House	69 Lincoln Ave	Winchendon	c 1861
WIN.80	Holland, Merrill House	75 Lincoln Ave	Winchendon	r 1875
WIN.81	Barnes, David H. House	84 Lincoln Ave	Winchendon	1880
WIN.82	Young, James P. House	85 Lincoln Ave	Winchendon	1923
WIN.83	Kimball, Anna - Beals, Frank L. House	94 Lincoln Ave	Winchendon	1885
WIN.84	Kimball, Anna House	113-115 Lincoln Ave	Winchendon	1897
WIN.85	Hayward House	123 Lincoln Ave	Winchendon	c 1887
WIN.114	White, Michael B. House	206-208 Lincoln Ave	Winchendon	c 1892
WIN.192	Alaska Freezer Company	283 Lincoln Ave	Winchendon	c 1902
WIN.375	Alaska Freezer Company	283 Lincoln Ave	Winchendon	c 1902
WIN.147	Clough, Willard House	13 Linden St	Winchendon	r 1876
WIN.148	Streeter, Frank E. House	29 Linden St	Winchendon	c 1890
WIN.149	Gay, Merrill D. House	36 Linden St	Winchendon	1898
WIN.150	White, Zadoc L. House	73 Linden St	Winchendon	c 1884
WIN.151	Baptist Parsonage	81 Linden St	Winchendon	1871
WIN.152	Russell, Edwin House	90 Linden St	Winchendon	1890
WIN.153	Dudley, Adiel H. House	105-107 Linden St	Winchendon	r 1874
WIN.417	Otter River State Forest - Visitor Contact Station	Main Rd	Winchendon	1938
WIN.922	Otter River State Forest - Beaman Pond	Main Rd	Winchendon	1934
WIN.923	Otter River State Forest - Beaman Pond Dam	Main Rd	Winchendon	1934
WIN.924	Otter River State Forest - Stonefaced Culvert	Main Rd	Winchendon	c 1934
WIN.313	Aldrich, Harrison House	25 Main St	Winchendon	c 1850
WIN.314	Hale, Orrin S. House	56 Main St	Winchendon	c 1885
WIN.315	Lawrence, Henry J. House	94 Main St	Winchendon	c 1875
WIN.317	Hitchcock, John H. House	103 Main St	Winchendon	c 1840
WIN.318	Allen, Celinda House	121 Main St	Winchendon	c 1885
WIN.319	Beals, Samuel House	169 Main St	Winchendon	c 1864
WIN.320		213 Main St	Winchendon	c 1900
WIN.321	Carter, Ellen House	214 Main St	Winchendon	c 1850
WIN.156	Loud, Edward House	91 Maple St	Winchendon	c 1840
WIN.157	Deland, William A. House	128 Maple St	Winchendon	1868
WIN.284	White, N. D. and Sons Worker Housing	357-359 Maple St	Winchendon	c 1898
WIN.285	White, N. D. and Sons Worker Housing	363-365 Maple St	Winchendon	c 1898
WIN.286	Gauthier, Joseph House	437 Maple St	Winchendon	c 1900
WIN.287	Ethier, Nazarre House	441 Maple St	Winchendon	r 1878
WIN.288	White, N. D. and Sons Worker Housing	456-458 Maple St	Winchendon	r 1910

Inv. No.	Property Name	Street	Town	Year
WIN.34	Fletch, John G. House	3-5 Mason St	Winchendon	1898
WIN.35	Armstrong, Richard S. House	15 Mason St	Winchendon	1909
WIN.36	Beck, Joseph Henry House	30 Mason St	Winchendon	c 1913
WIN.37	Buttemore, James - Willson, Edgar F. House	69-71 Mason St	Winchendon	c 1903
WIN.106	Maynard, Solon House	29 Maynard St	Winchendon	c 1869
WIN.108	Raymond and Rice Chair Shop	Mechanic St	Winchendon	c 1886
WIN.107	Brown, Frederick M. House	10-12 Mechanic St	Winchendon	c 1888
WIN.289	White Mansion Stables	1A Mill Cir	Winchendon	r 1850
WIN.290	White, Allan Temple House	1-2 Mill Cir	Winchendon	c 1860
WIN.291	Horton, Joseph House	3-4 Mill Cir	Winchendon	c 1861
WIN.385		8 Mill Cir	Winchendon	c 1843
WIN.292	White, N. D. and Sons Worker Housing	14-17 Mill Cir	Winchendon	r 1870
WIN.293	Minister's Cottage	18-19 Mill Cir	Winchendon	c 1847
WIN.384		150-152 Mill Cir	Winchendon	c 1860
WIN.343		132 Mill Glenn Rd	Winchendon	c 1830
WIN.109	Dary, Omar House	75 Mill St	Winchendon	c 1896
WIN.110	Abare, Louis House	110 Mill St	Winchendon	1923
WIN.111	Ellis, Charles House	191-193 Mill St	Winchendon	1898
WIN.112	Wright, Joseph H. House	200 Mill St	Winchendon	1889
WIN.177	Schoerner, Ferdinand House	16 Monadnock Ave	Winchendon	1923
WIN.178	Brown, Henry House	22 Monadnock Ave	Winchendon	1923
WIN.179	Prance, Leon House	42 Monadnock Ave	Winchendon	1933
WIN.180		47 Monadnock Ave	Winchendon	1925
WIN.75	Woodcock, William L. House	33 Morse Ave	Winchendon	c 1892
WIN.70	Streeter, Amro W. School	Murdock Ave	Winchendon	1939
WIN.71	Old Murdock High School	Murdock Ave	Winchendon	1887
WIN.900	Winchendon Soldiers' Monument	Murdock Ave	Winchendon	1889
WIN.72	Danforth, Charles H. House	87 Murdock Ave	Winchendon	1893
WIN.196	Cutter, John C. House	40 North St	Winchendon	c 1896
WIN.214	Corbin, Lillian M. House	34 North Vine St	Winchendon	c 1902
WIN.69	Poland School	Oak St	Winchendon	1924
WIN.360	Converse, George W. House	15 Oak St	Winchendon	c 1850
WIN.68	Dole, George R. House	88 Oak St	Winchendon	c 1880
WIN.344	Parsonage, The	Old Centre	Winchendon	c 1780
WIN.345	Smith House	Old Centre	Winchendon	c 1870
WIN.346	Estey House	Old Centre	Winchendon	c 1830
WIN.347	Day, Richard House	Old Centre	Winchendon	1752
WIN.348	Cummings House	Old Centre	Winchendon	

Inv. No.	Property Name	Street	Town	Year
WIN.349	Reed, Moses House	Old Centre	Winchendon	c 1830
WIN.351	Rice House	Old Centre	Winchendon	c 1830
WIN.353	Henshaw, Daniel House	Old Centre	Winchendon	c 1809
WIN.354	Godding, Alvin House	Old Centre	Winchendon	c 1826
WIN.411	First Congregational Church	Old Centre	Winchendon	1850
WIN.908	Winchendon Town Common	Old Centre	Winchendon	c 1900
WIN.909	Training Ground, Old	Old Centre	Winchendon	
WIN.910	Meetinghouse Grounds	Old Centre	Winchendon	
WIN.911	Stone Wall	Old Centre	Winchendon	
WIN.339	Raymond House	14 Otter River Rd	Winchendon	c 1790
WIN.340	Brown House	24 Otter River Rd	Winchendon	c 1770
WIN.341	Greenwood, Levi House	42 Otter River Rd	Winchendon	c 1800
WIN.41	Odett, Zula I. and Leo E. House	115 Park St	Winchendon	1924
WIN.115	Brabston, Patrick House	1-3 Pearl St	Winchendon	r 1878
WIN.116	Pratt, Reuben House	7-9-11 Pearl St	Winchendon	r 1874
WIN.117	Hanks, Charles O. House	126-128 Pearl St	Winchendon	c 1929
WIN.118	Lawrence, Mabel A. House	193 Pearl St	Winchendon	1912
WIN.119	Friech, William R. House	201 Pearl St	Winchendon	c 1912
WIN.246	Buckley, Mark House	16 Pine St	Winchendon	c 1860
WIN.247	Ready, Michael House	28 Pine St	Winchendon	c 1863
WIN.86	Winchendon Fire Station	16 Pleasant St	Winchendon	1876
WIN.87	Beals Memorial Library	50 Pleasant St	Winchendon	1913
WIN.361	Nash, Marvin House	56 Pleasant St	Winchendon	c 1850
WIN.88	Stearns, Charles T. and Allen M. House	88 Pleasant St	Winchendon	c 1869
WIN.89	Corey, Clara and Waldo House	93 Pleasant St	Winchendon	r 1880
WIN.90	Stearns, Charles T. House	96 Pleasant St	Winchendon	c 1870
WIN.91	Loud, George Sumner House	103 Pleasant St	Winchendon	1862
WIN.92	Beals, George L. House	104 Pleasant St	Winchendon	c 1870
WIN.93	Whitney, Orange and Ida F. House	122 Pleasant St	Winchendon	1900
WIN.94	Whitney, Richard House	145 Pleasant St	Winchendon	c 1870
WIN.95	Smith, Samuel House	148 Pleasant St	Winchendon	c 1861
WIN.96	Stanley House	151 Pleasant St	Winchendon	c 1862
WIN.215	Raymond, Merrick House	16 Prospect St	Winchendon	r 1850
WIN.216	Parks, Eliphalet House	22 Prospect St	Winchendon	r 1850
WIN.217	Hoar, Omar House	28 Prospect St	Winchendon	r 1840
WIN.218	Ellis, Bethuel House	34-36 Prospect St	Winchendon	r 1842
WIN.404	Goodspeed, Adin S. House	39 Prospect St	Winchendon	c 1900
WIN.219	Butler, Ebenezer House	44-46 Prospect St	Winchendon	r 1842

Inv. No.	Property Name	Street	Town	Year
WIN.220	Piper, Daniel H. House	45 Prospect St	Winchendon	c 1883
WIN.221	Goodspeed, George N. and Harrison P. House	50-58 Prospect St	Winchendon	r 1860
WIN.222	Johanneson, Gustave House	60 Prospect St	Winchendon	r 1900
WIN.223	Fife, Arthur F. House	64 Prospect St	Winchendon	r 1900
WIN.224	Davis, Leon W. House	68 Prospect St	Winchendon	r 1900
WIN.225	Mellen, Clarence House	72 Prospect St	Winchendon	r 1900
WIN.226	Streeter, Alvin House	75 Prospect St	Winchendon	r 1879
WIN.105	Wye Knitting Mills	Railroad St	Winchendon	c 1870
WIN.304	Murdock, Elisha and Company Drying House	River St	Winchendon	r 1878
WIN.394	Poor, David House	River St	Winchendon	c 1810
WIN.906	Dow, Lorenzo Marker	River St	Winchendon	c 1950
WIN.16	Robbins, J. A. Mill	36 River St	Winchendon	c 1860
WIN.298	Taylor, William House	189 River St	Winchendon	c 1855
WIN.299		195 River St	Winchendon	c 1860
WIN.300	Woodcock, W.L. House	356 River St	Winchendon	c 1855
WIN.301	Murdock, Elisha and Company	363 River St	Winchendon	c 1870
WIN.302	Aldrich, S. C. House	424 River St	Winchendon	c 1870
WIN.303	Murdock, Elisha and Company Warehouse	426 River St	Winchendon	r 1878
WIN.305	Woodcock and Sawyer Worker Housing	563 River St	Winchendon	c 1830
WIN.416	Alger, Columbus C. House	Rt 202	Winchendon	c 1795
WIN.342	Russell, Frederick W. House	1 Russell Farm Rd	Winchendon	c 1830
WIN.46	Winchendon Academy	School Sq	Winchendon	1843
WIN.47		10-12 School Sq	Winchendon	1833
WIN.48		14-16 School Sq	Winchendon	1833
WIN.901	Watering Trough	School St	Winchendon	1875
WIN.902	Spirit of the American Doughboy Monument	School St	Winchendon	1934
WIN.49	Whitney, William W. House	5-7 School St	Winchendon	r 1850
WIN.50	Scott, Daniel M. and Salmon M. House	11 School St	Winchendon	r 1840
WIN.51	Winch, Aaron House	19 School St	Winchendon	r 1850
WIN.52	Richardson, Luther House	27 School St	Winchendon	c 1830
WIN.53	Winchendon Academy Dormitory	35 School St	Winchendon	c 1843
WIN.55	Carr, Henry F. House	65 School St	Winchendon	r 1845
WIN.56	Richardson, John N. House	81 School St	Winchendon	c 1877
WIN.57	Baldwin, James J. House	87-93 School St	Winchendon	c 1877
WIN.58	Drury, Frank E. House	112 School St	Winchendon	1903
WIN.59	Roebuck, Alfred L. House	132 School St	Winchendon	1921
WIN.60	Brown, Mary E. House	137 School St	Winchendon	c 1909
WIN.61	Bartlett, Martin L. House	144 School St	Winchendon	c 1892

Inv. No.	Property Name	Street	Town	Year
WIN.62	Whitcomb, Arthur W. House	151 School St	Winchendon	1888
WIN.113	French, Frederick D. House	197 School St	Winchendon	c 1903
WIN.120	Townsend, Guy House	269 School St	Winchendon	1917
WIN.333	Darling, John House	363 School St	Winchendon	r 1770
WIN.338		23 Sibley Rd	Winchendon	c 1820
WIN.376	Pump House, Old	Spring St	Winchendon	1896
WIN.912	Spring Street Bridge	Spring St	Winchendon	1937
WIN.920	Toy Town Plaza Entrance	Spring St	Winchendon	
WIN.921	Spring Street Bridge over Millers River	Spring St	Winchendon	1926
WIN.408		24 Spring St	Winchendon	r 1850
WIN.407		36 Spring St	Winchendon	r 1850
WIN.377		144 Spring St	Winchendon	c 1860
WIN.243	McCabe, Patrick House	151 Spring St	Winchendon	1867
WIN.244	Oliva, Louis House	160-162 Spring St	Winchendon	1926
WIN.245	Conner, Humphrey House	168 Spring St	Winchendon	c 1866
WIN.248	Sullivan, John J. House	179-181 Spring St	Winchendon	r 1892
WIN.378	Ready, Patrick House	189 Spring St	Winchendon	c 1860
WIN.249	McGrath, John House	190 Spring St	Winchendon	r 1874
WIN.250	Lees, Joseph House	202 Spring St	Winchendon	r 1840
WIN.253	Donahue, James House	211 Spring St	Winchendon	1867
WIN.101	Immaculate Heart of Mary Church	Spruce St	Winchendon	1909
WIN.102	Kimball, Addison House	83 Spruce St	Winchendon	c 1868
WIN.103	Flagg, Levi P. House	88 Spruce St	Winchendon	c 1862
WIN.104	Lafleur, Nelson House	130-132 Spruce St	Winchendon	1903
WIN.145	Whitney, Baxter D. and Son - Barn	25 Summer Dr	Winchendon	c 1830
WIN.146	Whitney, Baxter - White, Nelson Cotton Mill	25 Summer Dr	Winchendon	1854
WIN.370	Whitney, Baxter D. and Son - Machine Shop	25 Summer Dr	Winchendon	c 1830
WIN.371	Whitney, Baxter D. and Son - Storage Attic	25 Summer Dr	Winchendon	c 1830
WIN.372	Whitney, Baxter D. and Son - Erecting Shop	25 Summer Dr	Winchendon	c 1830
WIN.402	Whitney, Baxter D. and Son - Foundary	25 Summer Dr	Winchendon	c 1830
WIN.373	Woodbury, James House	110 Summer St	Winchendon	c 1850
WIN.350	Wilder, Oliver House	Teel Rd	Winchendon	1870
WIN.330	Tolman House	Tolman Rd	Winchendon	c 1816
WIN.395	Vose, Reuben House	Town Farm Rd	Winchendon	c 1830
WIN.905	Brown, Samuel Jr. Monument	Town Farm Rd	Winchendon	c 1833
WIN.367	Bryant, George House	13 Walnut St	Winchendon	c 1843
WIN.141	Lord, Ephraim W. House	20-22 Walnut St	Winchendon	c 1850
WIN.142	Shurtleff, R. M. House	21 Walnut St	Winchendon	c 1830

Inv. No.	Property Name	Street	Town	Year
WIN.143	Watson, Joseph S. House	25 Walnut St	Winchendon	c 1830
WIN.368	Hale, Luke House	26 Walnut St	Winchendon	1843
WIN.144	Brown, William - Mason, Henry House	32 Walnut St	Winchendon	c 1840
WIN.369	Merrill, Edwin Seymour House	33 Walnut St	Winchendon	1844
WIN.54	Brown, Seth House	6 West St	Winchendon	r 1842
WIN.42	Irwin, John T. House	126 West St	Winchendon	c 1892
WIN.43	Boutell, Albert House	157 West St	Winchendon	1927
WIN.44	Webber, Thaddeus House	159 West St	Winchendon	1924
WIN.45	Holman, William W. House	160 West St	Winchendon	c 1893
WIN.324	Taylor, Jacob House	422 West St	Winchendon	r 1840
WIN.325	Savin, Howard House	425 West St	Winchendon	r 1850
WIN.326	Robbins, Joseph House	431 West St	Winchendon	c 1830
WIN.316	Waterville School	Whitney St	Winchendon	r 1871
WIN.295	Nelson Mills Office	Winchendon Springs	Winchendon	r 1858
WIN.296	White, N. D. and Sons	Winchendon Springs	Winchendon	r 1856
WIN.382	Tolman, Stephen House	Windsor Rd	Winchendon	c 1830
WIN.200	Patria, Benjamin House	10 Winter Pl	Winchendon	c 1907
WIN.201	Roach, William F. - Carr, Roy House	11-13 Winter Pl	Winchendon	c 1908
WIN.202	Spooner, Elbridge A. House	14 Winter Pl	Winchendon	c 1909
WIN.203	Cashin, Edgar N. House	11 Winter St	Winchendon	c 1907
WIN.204	Youdan, Thomas House	17 Winter St	Winchendon	1909
WIN.205	McCaffrey, Patrick F. House	39 Winter St	Winchendon	1909
WIN.206	Willis, Wenworth House	51 Winter St	Winchendon	c 1911
WIN.260	Woodbury, Samuel D. House	Woodenbury Rd	Winchendon	1783

Appendix E

Sanitary Sewer Overflow Inventory

SSO Inventory (July 1, 2018 – June 30, 2023)
Winchendon, MA

Below is a summary table of sanitary sewer overflows that have occurred in the Town of Winchendon from 2018 through 2023. Following the summary table are detailed descriptions of each SSO occurrence. These SSOs have been reported to MassDEP in accordance with state regulations.

Date	Time	Location	Discharge to surface water or MS4	Estimated SSO Volume	Cause of SSO	Mitigation/Corrective Measures Completed
6/21/2020	3:49 PM – 4:45 PM	Roadway	No	200 gallons	Blockage	See detailed description below

- No SSOs reported in **FY2023**
- No SSOs reported in **FY2022**
- On **June 21, 2020** at 3:49 PM, the Sewer Department was notified of sewage coming out of a manhole and discharging to the ground surface. After responding and investigating, a blockage was discovered in the sewer system. The total volume of wastewater discharged was estimated to be approximately 200 gallons. Sewer Department staff jetted the line, the blockage cleared, and levels dropped down to normal level. Staff jetted the line again once levels were at normal running level and encountered no additional issues.
- No SSOs reported in **2019**
- No SSOs occurred in **2018**

Appendix F

Plan Amendment Log

Amend. No.	Description of the Amendment	Date of Amendment	Amendment Prepared by

1	The Stormwater Management Plan has been amended as follows:
	• Updated Workplan for Permit Year 3 activities and to reflect changes to impaired waters
	• Updated Stormwater Management Program Team to reflect staff changes
	• Updated BMPs 3A, 4A, 4B, and 5A with the newly adopted Article 31: Stormwater Management Bylaw and Stormwater Management Regulations and enforcing authority information
	• Updated BMPs 6A, 6B, and 6D with the title of the municipal good housekeeping program
	• Updated BMP 6C to indicate Winchendon does not require a site-specific SWPPP. This determination was submitted to EPA and MassDEP in the Year 3 annual report on September 28, 2021.
	• Updated impaired waters requirements based on the 2016 303(d) List:
	    ○ Requirements of Appendix H, Parts II, III, and V for phosphorus, bacteria, and solids, respectively, are no longer applicable to Winchendon because the impairments for Millers River (MA35-01) and Otter River (MA35-08) were removed from the 2016 303(d) Integrated List. This determination was submitted to EPA and MassDEP in the Year 2 annual report on September 3, 2020. A description of modifications to receiving waters were submitted to EPA and MassDEP in the Year 3 annual report on September 28, 2021.
	• Updated Appendix E, Sanitary Sewer Overflow Inventory
	• Added the following documents to Appendix H, Record Keeping:
	    ○ MS4 Record Keeping log
	    ○ Year 1, Year 2, and Year 3 Annual Reports and associated attachments
	• Added the Lake Phosphorus Control Plan (LPCP) for Winchendon's Lakes and Ponds in Millers River Basin – *Legal Analysis*, June 2021 to Appendix I
		December 2021	Cassandra LaRochelle, PE
			Project Engineer
			Tighe&Bond

Amend. No.	Description of the Amendment	Date of Amendment	Amendment Prepared by
2	The Illicit Discharge Detection and Elimination Plan has been amended as follows: • Revised Section 4, Non-Stormwater Discharge Bylaw, to include the Town's new Stormwater Management Bylaw which regulates non-stormwater discharges to the MS4. Added the new Bylaw to Appendix D. • Appendix B – updated SSO Inventory • Appendix H – added IDDE employee training records • Appendix I – added 2019 Outfall Mapping Field Effort Summary, March 2020	December 2021	Cassandra LaRochelle, PE Project Engineer Tighe&Bond
3	The **Stormwater Management Plan** has been amended as follows: • Updated the Workplan • Appendix E – updated SSO Inventory • Appendix H – updated MS4 Record Keeping Log • Appendix H – added Year 4 Annual Reports and associated attachments • Appendix I – added 2022 Lake Phosphorus Control Plan The **Illicit Discharge Detection and Elimination Plan** has been amended as follows: • Appendix B – updated SSO Inventory • Appendix F – added MS4 Catchment Investigation Procedures • Appendix G – added 2018/2020 303(d) List	December 2022	Cassandra LaRochelle, PE Project Manager Tighe&Bond

Amend. No.	Description of the Amendment	Date of Amendment	Amendment Prepared by
4	The **Stormwater Management Plan** has been amended as follows: • Updated Workplan • Appendix E – updated SSO Inventory • Appendix H – updated MS4 Record Keeping Log and added Year 5 Annual Report and associated attachments The **Illicit Discharge Detection and Elimination Plan** has been amended as follows: • Appendix B – updated SSO Inventory • Appendix G – added Summary of Winchendon's TMDLs and Impaired Waters and 2022 303(d) List • Appendix H – added IDDE employee training records • Appendix I – added Phase I Mapping Field Effort Summary, September 2023	November 2023	Cassandra LaRochelle, PE Project Manager Tighe&Bond
5			
6			
7			
8			

Appendix G

Reference Documents

Pollutant Impacts on Water Quality	
Sediment	Sediment is a common component of stormwater, and can be a pollutant. Sediment can be detrimental to aquatic life (primary producers, benthic invertebrates, and fish) by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. Sediment can transport other pollutants that are attached to it including nutrients, trace metals, and hydrocarbons. Sediment is the primary component of total suspended solids (TSS), a common water quality analytical parameter.
Nutrients	Nutrients including nitrogen and phosphorous are the major plant nutrients used for fertilizing landscapes, and are often found in stormwater. These nutrients can result in excessive or accelerated growth of vegetation, such as algae, resulting in impaired use of water in lakes and other sources of water supply. For example, nutrients have led to a loss of water clarity in Lake Tahoe. In addition, un-ionized ammonia (one of the nitrogen forms) can be toxic to fish.
Bacteria and Viruses	Bacteria and viruses are common contaminates of stormwater. For separate storm drain systems, sources of these contaminants include animal excrement and sanitary sewer overflow. High levels of indicator bacteria in stormwater have led to the closure of beaches, lakes, and rivers to contact recreation such as swimming.
Oil and Grease	Oil and grease includes a wide array of hydrocarbon compounds, some of which are toxic to aquatic organisms at low concentrations. Sources of oil and grease include leakage, spills, cleaning and sloughing associated with vehicle and equipment engines and suspensions, leaking and breaks in hydraulic systems, restaurants, and waste oil disposal.
Metals	Metals including lead, zinc, cadmium, copper, chromium, and nickel are commonly found in stormwater. Many of the artificial surfaces of the urban environment (e.g., galvanized metal, paint, automobiles, or preserved wood) contain metals, which enter stormwater as the surfaces corrode, flake, dissolve, decay, or leach. Over half the trace metal load carried in stormwater is associated with sediments. Metals are of concern because they are toxic to aquatic organisms, can bioaccumulate (accumulate to toxic levels in aquatic animals such as fish), and have the potential to contaminate drinking water supplies.
Organics	Organics may be found in stormwater at low concentrations. Often synthetic organic compounds (adhesives, cleaners, sealants, solvents, etc.) are widely applied and may be improperly stored and disposed. In addition, deliberate dumping of these chemicals into storm drains and inlets causes environmental harm to waterways.
Pesticides	Pesticides (including herbicides, fungicides, rodenticides, and insecticides) have been repeatedly detected in stormwater at toxic levels, even when pesticides have been applied in accordance with label instructions. As pesticide use has increased, so too have concerns about the adverse effects of pesticides on the environment and human health. Accumulation of these compounds in simple aquatic organisms, such as plankton, provides an avenue for biomagnification through the food web, potentially resulting in elevated levels of toxins in organisms that feed on them, such as fish and birds.
Gross Pollutants	Gross Pollutants (trash, debris and floatables) may include heavy metals, pesticides, and bacteria in stormwater. Typically resulting from an urban environment, industrial sites and construction sites, trash and floatables may create an aesthetic “eye sore” in waterways. Gross pollutants also include plant debris (such as leaves and lawn-clippings from landscape maintenance), animal excrement, street litter, and other organic matter. Such substances may harbor bacteria, viruses, vectors, and depress the dissolved oxygen levels in streams, lakes and estuaries sometimes causing fish kills.
Vector Production	Vector production (e.g., mosquitoes, flies, and rodents) is frequently associated with sheltered habitats and standing water. Unless designed and maintained properly, standing water may occur in treatment control BMP’s for 72 hours or more, thus providing a source for vector habitat and reproduction (Metzger, 2002).

Source: California Stormwater Quality Association, Stormwater BMP Handbook, 2003.

Potential pollutants likely associated with specific *municipal facilities*

Municipality Facility Activity	Potential Pollutants								
	Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides	Oxygen Demanding Substances
Building and Grounds Maintenance and Repair	X	X	X	X	X	X	X	X	X
Parking/Storage Area Maintenance	X	X	X	X	X	X	X		X
Waste Handling and Disposal	X	X	X	X	X	X	X	X	X
Vehicle and Equipment Fueling			X	X		X	X		
Vehicle and Equipment Maintenance and Repair				X		X	X		
Vehicle and Equipment Washing and Steam Cleaning	X	X	X	X		X	X		
Outdoor Loading and Unloading of Materials	X	X	X	X		X	X	X	X
Outdoor Container Storage of Liquids		X		X		X	X	X	X
Outdoor Storage of Raw Materials	X	X	X			X	X	X	X
Outdoor Process Equipment	X		X	X		X	X		
Overwater Activities			X	X	X	X	X	X	X
Landscape Maintenance	X	X	X		X			X	X
Source: California Stormwater BMP Handbook (http://www.cabmphandbooks.com/)(slightly modified)									

Potential pollutants likely associated with *municipal activities*

Municipal Program	Activities	Potential Pollutants								
		Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides	Oxygen Demanding Substances
Roads, Streets, and Highways Operation and Maintenance	Sweeping and Cleaning	X		X	X		X			X
	Street Repair, Maintenance, and Striping/Painting	X		X	X		X	X		
	Bridge and Structure Maintenance	X		X	X		X	X		
Plaza, Sidewalk, and Parking Lot Maintenance and Cleaning	Surface Cleaning	X	X			X	X			X
	Graffiti Cleaning	X	X		X			X		
	Sidewalk Repair	X		X						
	Controlling Litter	X		X		X	X			X
Fountains, Pools, Lakes, and Lagoons Maintenance	Fountain and Pool Draining		X					X		
	Lake and Lagoon Maintenance	X	X	X		X			X	X
Landscape Maintenance	Mowing/Trimming/Planting	X	X	X		X			X	X
	Fertilizer & Pesticide Management	X	X						X	
	Managing Landscape Wastes			X					X	X
	Erosion Control	X	X							
Drainage System Operation and Maintenance	Inspection and Cleaning of Stormwater Conveyance Structures	X	X	X		X		X		X
	Controlling Illicit Connections and Discharges	X	X	X	X	X	X	X	X	X
	Controlling Illegal Dumping	X	X	X	X	X	X	X	X	X
	Maintenance of Inlet and Outlet Structures	X		X	X		X			X
Waste Handling and Disposal	Solid Waste Collection		X	X	X	X	X	X		X
	Waste Reduction and Recycling			X	X					X
	Household Hazardous Waste Collection			X	X		X	X	X	
	Controlling Litter			X	X	X		X		X
	Controlling Illegal Dumping	X		X		X	X		X	X
Water and Sewer Utility Operation and Maintenance	Water Line Maintenance	X				X	X			
	Sanitary Sewer Maintenance	X				X	X			X
	Spill/Leak/Overflow Control, Response, and Containment	X	X			X		X		X
Source: California Stormwater BMP Handbook (http://www.cabmphandbooks.com/)										

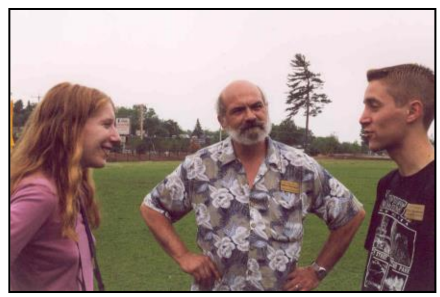
Tips for Organizing and Conducting Volunteer Clean-up Events

By: Jen Drociak –Acting Coordinator / Volunteer, Manchester Urban Ponds Restoration Program (UPRP)

Step 1: Plan Your Clean-Up Event

A. Land and / or Shore? Determine the Location(s): Determine where, in proximity to the waterbody, your group wishes to concentrate its efforts on during a clean-up event. To find heavily-littered areas, and / or areas that are prone to illegal dumping, walk along the shore, in advance, to identify location(s) for the clean-up event. Identify accessible paths along the shoreline and / or on public trails that are easy for people to walk. The location(s) may be largely determined by public (or lake / homeowner association) access points such as a public beach, boat-launch, or park. If the location is large, consider identifying smaller locations within the larger location which can be managed by individual group leaders and groups. Determining the location(s) will provide you with an idea of the footwear that may be needed for the task based upon the terrain. If the clean-up event will be located at a beach or a dry area, sandals or sneakers may be adequate. If it will be located in a wetland or mucky area, knee-boots may be appropriate. If it will be located in water, hip-boots may be most appropriate. Determining the location(s) will also provide you with a sense of how many volunteers your group is seeking for the clean-up event.

The UPRP typically focuses clean-up efforts in the parks adjacent to the ponds by skirting around the ponds themselves. This involves differing terrain, and thus footwear. There have been occasions, however, where one or more volunteers have also used a small fishing boat to retrieve trash from the water that is too deep to obtain via hip-waders.



B. Obtain Landowner Permission: Whether the location(s) of your clean-up event is / are municipally-owned or privately-owned, determine who owns the property in advance in order to obtain permission. If you do not know who the property owner is, visit your municipality's on-line assessor's website to review the tax map(s) and property card(s) associated with the area. It is typically easy to obtain permission to organize a clean-up on municipally-owned / public land. If the location(s) are on privately-owned land, talk to the land owner(s) and explain why you are organizing a clean-up in that area, along with the benefits of doing so. Obtain permission from them in writing, if you can, by considering they sign a form. Verbal permission may be adequate, however.

The UPRP organizes clean-up events on land owned by Public Works and Parks, Recreation, and Cemetery Departments. We have not had to seek private landowner permission. We simply notify the Manchester Public Works Department and Parks, Recreation, and Cemetery Department of the dates of the clean-up events.

C. Determine the Task(s) at Hand: Determine what you will request of your volunteers. Will it be the removal of trash only? If so, will it be the removal of large items only or all items including the minutia? Will it be the removal of yard waste only? Graffiti removal or other vandalism? All of the above? Determining the task(s) at hand will provide you with an idea of the supplies (and hours) you will need to perform the task(s).

The UPRP typically removes trash only. We typically do not pick up the minutia (cigarette butts, bottle caps, etc.) due to the large volume of trash we collect and the limited amount of time and volunteers we have at each clean-up event.

D. Determine the Check-In Location: Based upon the chosen location(s) of the clean-up event, consider and determine the most appropriate location for volunteers to initially gather to check in and obtain supplies, as well as to reconvene at the end of the clean-up event. This may be a kiosk, boat-launch, or specific location on a beach or in a park. Try to stay away from busy roads or areas that are difficult to access.

The UPRP typically requests that volunteers meet in one central / well-known location such as a kiosk in a parking lot or boat-launch. We have kept the initial meeting location at each clean-up event consistent over the years.

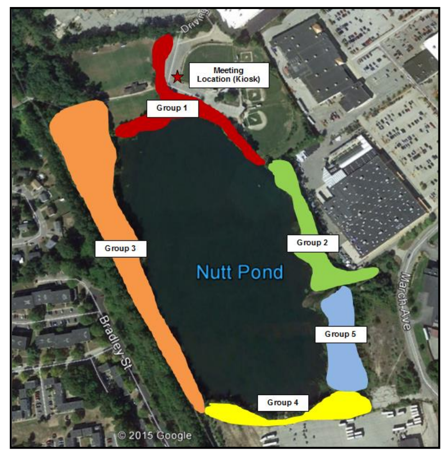
E. Determine the Most Appropriate Age(s) of Your Volunteers: Based upon the task(s) at hand, determine the most appropriate age(s) of your volunteers. Are you seeking adults only? Children? Both? Do you have tasks that all can partake in, or are the tasks age-specific?

The UPRP generally seeks volunteers of all ages for clean-up events and encourage everyone, despite their age or ability, to participate in a manner of how they most feel comfortable.

F. Determine the Desired Number of Volunteers: Based upon the number and location(s) that are chosen for the clean-up event, determine the desired number of volunteers to partake in the event.

The UPRP typically splits the area adjacent to the ponds into several areas, or groups of volunteers.

G. Create Map(s) of the Location(s) <u>OR</u> Plan on Designating a "Group Leader" for Each Location: If the location(s) is / are large enough to break into more than one group during the clean-up event, consider making aerial photographic "maps" (or using topographic maps) of each group's area, indicating on the map the original meeting location, and the group's start and end point.



The UPRP has created aerial maps to use in the past. However, what we consider to be more helpful is having a "group leader" (returning volunteer or someone familiar with the area) lead a small group of other volunteers in each designated area.

Step 2: Schedule Your Clean-Up Event

A. Choose a Date: Choose a date for the clean-up event at a time of year that makes the most sense to your group. Keep in mind that while lakes and ponds have year-round residents, the majority of residents are likely seasonal and may not arrive for the season, or on or around Memorial Day weekend. Thus, a late-spring or late-fall cleanup may not be the most appropriate time as it may not garner the most volunteers. An early or mid-summer cleanup may be the most appropriate. Consider, perhaps, scheduling the event in conjunction with an annual lake association meeting or holiday barbeque. Also consider scheduling the date of the clean-up event at least a month in advance to allow time to prepare (gather supplies and recruit volunteers). Lastly, consider a rain date.

The UPRP typically schedules annual pond and park cleanups on Saturday mornings during the last two weeks in April and the first one or two weeks in May. This is because a) this time of year is typically after the snow has melted and b) this time of year is typically before "leaf-in" (and in the case of some of these areas, this is important, as the areas are overtaken with thick stands of invasive species). We do not offer rain dates.

B. Choose a Time: Determine the amount of time it may take to clean up the area(s) of your choosing. Will it take one hour? Two hours? More? This is also a factor of the number of volunteers that attend (typically the more volunteers that attend the least amount of time the clean-up will take). If you believe the area(s) may take more than two hours, it may be best to schedule a two-part clean-up event. Also consider the time of day most appropriate to your group, especially if it is scheduled in conjunction with (or before or after) another event such as an annual meeting or holiday barbeque.

The UPRP has realized that 1 ½ - 2 hours is a sufficient amount of time to allot to clean-up events. We also realize that volunteers typically do not have the time or patience to commit to any more time in one day than that. We have also typically scheduled the clean-up events from 9:00AM to 11:00AM, with a meeting time of no later than 8:50AM. Early-morning clean-up events afford volunteers to have the remainder of the day for other things.

Step 3: Determine and Obtain Necessary Supplies

A. Determine the Necessary Supplies: Determining the task(s) at hand will determine your necessary supplies. If your clean-up event is strictly a trash removal cleanup, you may only need to obtain latex gloves and trash bags. If your clean-up event also includes yard-waste removal, you may need to obtain paper yard-waste bags, rakes and / or other tools.

Since the UPRP clean-up events are strictly focused on trash-removal, the only supplies we must procure are latex gloves (medium sized) and trash bags. We also have a few hand-held trash-grabbers since some volunteers find them helpful in reaching difficult areas and / or to prevent excessive bending.

B. Obtain the Necessary Supplies: Determine how you will obtain the necessary supplies. Does your group have a budget? Will your group be purchasing your supplies? Will your group fundraise to purchase supplies? Will your group borrow supplies, from perhaps the town or city?

The UPRP typically obtains supplies from the Manchester Parks, Recreation, and Cemetery Department. These supplies typically only include latex gloves and trash bags, but have included, in the past, rakes, other tools and yard waste bags. We also typically have a large container of hand-sanitizer available.

C. Obtain a First-Aid Kit: Consider obtaining one or more First Aid kits (for one or more groups of volunteers) in case it is needed. It is better to be proactively safe!

The UPRP has one First-Aid kit for use.

D. Consider Providing Water and Snacks: If your group has the financial means, consider providing water and snacks to your volunteers for afterwards. If your group does not have the financial means, consider soliciting donations from local establishments or having your group bake some treats, and bring a large cooler of ice water (or iced-tea) and some paper (or reusable plastic) cups.

The UPRP does not regularly provide water and snacks to volunteers since we do not have a budget to do so. On occasion, we have been able to obtain donations for yogurt snacks from Stonyfield Farm. On occasion we have also brought or made a baked good.

Step 4: Determine Your Waste Disposal Options

A. Determine Your Waste Disposal Options: At the end of your clean-up event, determine how and where you will dispose of the trash that was collected. Is there a dumpster on site that your group has permission to use? Are there already trash and / or recycling carts on site that your group has permission to use? If not, consider contacting your municipality's Highway Department, Parks & Recreation Department, or Road Agent, at least a month in advance, who may be able to coordinate trash and / or recycling pickup from your municipality's vendor (i.e. Waste Management, Pinard, etc.). Determine when the trash and / or recycling will be picked up and what the requirements for pickup are (especially with items such as vehicular tires and batteries, etc.). In addition, consider recruiting volunteers with pick-up trucks, especially if your group is cleaning multiple areas, and trash must be stockpiled in one area at the end of the event. Similarly, if you cannot obtain trash pick-up services, volunteers with pick-up trucks, and a municipal sticker (or permission) may be able to haul the trash and / or recycling to your local landfill or transfer station for free.

The UPRP typically sends notification of the clean-up schedule to the Manchester Public Works Director as soon as the dates are calendared. The Public Works Director, or staff, has coordinated with Manchester's solid waste collection staff to collect the trash on the Monday following the cleanup event (which have been held on Saturdays). While there have been a few times the Public Works Department has made one or more 95-gallon recycling carts available for the clean-up events, they are generally not available, and therefore, recycling is not typically sorted from other debris. All (tied / secure) bags of trash have been neatly placed in the same locations over the years; typically underneath or adjacent to the informational kiosks. Trash collected that does not fit into bags is also neatly placed adjacent to the bagged trash. We also recruit volunteers with pick-up trucks so that trash from different areas of the cleanup can be taken to one designated location at the end of the event. In addition, one of our volunteers separates steel and other scrap metal and takes it to a scrap metal recycling facility.

Step 5: Advertise Your Clean-Up Event / Recruit Volunteers

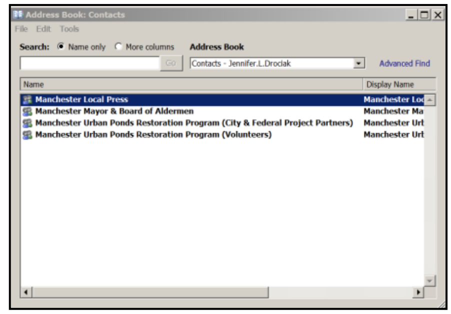
A. Determine Any Project Partners: In addition to volunteers who live around the waterbody, and any other residents of the town, determining any existing local groups or clubs that may be able to assist with the clean-up event is always helpful. Is there a local middle school, high school, or even college (if nearby) environmental club? A local chapter of the Student Conservation Association (SCA)? Any other organization, volunteer group, or club? A lot of these groups and / or clubs seek new community service projects and can help you garner additional / new volunteers.

The UPRP has partnered with the Student Conservation Association, local high school ecology clubs, local boy-scout troops, trout-fishing clubs, geo-cashing groups, and others in the past. This has helped garner additional / new volunteers.

B. Determine the Best Way(s) to Advertise Your Clean-Up Event: Determine the target audience of volunteers and consider the best way(s) to advertise your clean-up event. Is it by e-mail? Website? Post-card? Posting of a flyer on a community bulletin board and / or kiosk? An annual lake association newsletter? An advertisement in a local newspaper? TV? Radio? facebook / social media? All of the above? Remember, printed materials and postage cost money, as typically do newspaper and radio advertisements. If your group has available funds for this, that is one thing. If not, instead of simply placing a paid advertisement in a newspaper, try reaching out to a local news reporter to see if s/he will write a story about your cleanup (or write and submit an op-ed piece). This is usually good, free, advertisement. Also determine the most appropriate time to advertise for the clean-up event. Will you be advertising only once, or multiple times before the event?

The UPRP has typically advertised clean-up events in the following manners: 1) The UPRP webpage, 2) The City of Manchester website "Calendar of Events", 3) the UPRP facebook page, and 4) E-newsletter / e-mail. Local newspapers are also always gracious to cover the event(s) in a story beforehand. The UPRP typically sends posts the clean-up events on the website, and sends out an e-mail approximately three weeks in advance of the cleanup. The UPRP will then send weekly e-mails.

C. Create an E-Mail Distribution List: If you don't already have an e-mail distribution list, consider creating one. This may include names and e-mail addresses of lake association members, conservation commissioners, selectmen, municipal employees / department heads and others you know who may be interested. You can add to this with each clean-up event your group coordinates. If you have access to Constant Contact, Mailer, Mail Chimp, or other similar e-mail platform, this may be easier and more appropriate to use. If not, e-mail is a good starting place.



The UPRP has an e-mail distribution list which consists of approximately 200 individuals consisting of city aldermen, city department heads, conservation commissioners, media contacts, active school groups and other environmental organizations, and former volunteers. With every e-mail sent, an option is sent to opt-out of receiving e-mails by having a name and e-mail address removed from the list. This list is updated at least twice a year.

D. Before You Mail, Post, (or Hit the Send Button): Before you mail or post your flyer, or hit the send button to your e-mail distribution list, be sure to include the Who, What, Where, When, Why, and How to ensure all information is readily available. Why are you seeking volunteers? Who are you seeking as volunteers? What tasks are you seeking of volunteers? Where (general location and specific meeting location) are you seeking volunteers? When (date / time) are you seeking volunteers? Is there a rain date? How will the tasks be conducted? What should the volunteers wear or bring? What will be provided? Are you requesting an RSVP? For more information, who should they contact? Prepare your volunteers by letting them know what time to arrive, what to wear (clothes that can get dirty or wet, long pants, work gloves, boots or sturdy shoes, etc.), what to bring (sunscreen, insect repellant, water) and what to do in case of bad weather (rain date or cancellation information / phone number).

Manchester Urban Ponds Restoration Program

City of Manchester Environmental Protection Division
300 Winston Street
Manchester, NH 03103
(603) 665-6899 / www.manchesternh.gov/urbanponds

Spring 2014 Program Update

Visit Us on the Web!

www.manchesternh.gov/urbanponds

This winter, we've updated our website. You will no longer see an individual page for each waterbody. Instead, you will find the following pages:

- Home Page
- Clean-Up Events
- Water Quality Data
- Publications
- Contact Us

How's the Water?

New On-Line Publications Available!

- "All Ponds Water Quality Parameter Data Tables (2000 – 2013)."
- 2013 individual and regional VLAP and VRAP (water quality data) reports.
- Information on the McQuesten Brook Watershed Restoration Project!
- Pond Clean-Up Summary Tables & Graphs (2000-2013).

Watch Us on Manchester Public Television!

- **Monday April 14, 2014:** Jen Drociak will be visiting with Jane Beaulieu and taping a one-hour segment on the Manchester Urban Ponds Restoration Program on the Jane Beaulieu Report. This meeting is not taped live but is re-broadcast on Channel 23 on Monday (4/14) at 9:30pm, Tuesday (4/15) at 6:30pm, and Sunday (4/20) at 10:30am.
- **Wednesday April 23, 2014:** Jen Drociak and Jeff Marcoux will be presenting the history and current status of the Manchester Urban Ponds Restoration Program to the Manchester Conservation Commission. The meeting begins at 5:30pm and will be taped live on Channel 22 and later re-broadcast.

Read About Us in This Week's Hippo!

- **April 24, 2014 – May 1, 2014**

Join Us at an Annual Pond & Park Cleanup!

- **Saturday April 26, 2014** (9:00 – 11:00) Black Brook / Blodget Park *Meet in parking lot*
- **Saturday May 3, 2014** (9:00 – 11:00) Stevens Pond / Park *Meet at informational kiosk at boat ramp*
- **Saturday May 3, 2014** (9:00 – 12:00) Crystal Lake Park Sponsored by the Crystal Lake Preservation Association *Meet at informational kiosk at beach*
- **Saturday May 10, 2014** (9:00 – 12:00) Nutts Pond / Precourt Park *Meet at informational kiosk*
- **Sunday May 18, 2014** (9:00 – 11:00) Dorrs Pond / Livingston Park Sponsored by the Manchester Student Conservation Association (SCA) *Meet at informational kiosk in parking lot*
- **Friday June 13, 2014** (8:00 – 12:00) McQuesten Pond & Brook Sponsored by the New Hampshire Rivers Council *Meet at informational kiosk at Wolfe Park*

Please dress appropriate for weather and wear rubber knee boots! Latex gloves and trash bags will be provided. Just bring yourself, a friend, and a sense of community spirit! Please arrive no later than 8:50am as we will break into groups and begin cleanups promptly at 9:00am.

Household Hazardous Waste Day
Saturday May 9, 2014 (9:00AM – 2:00PM)

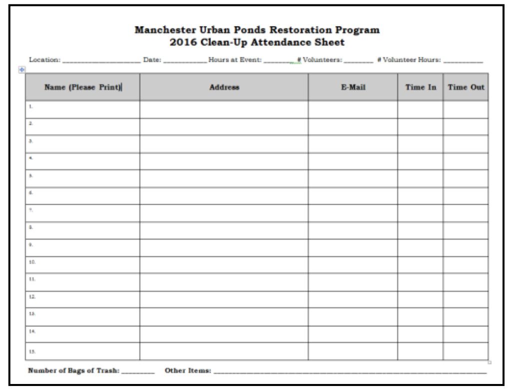
For Example: Seeking volunteers of all ages to assist in an annual trash clean-up at Black Brook and Blodget Park in Manchester on Saturday, April 23, 2016 from 9:00AM – 11:00AM. Volunteers will partner to clean the park and skirt the edges of the brook and wetland complex to remove accumulated trash. Please dress appropriately for weather as no rain date is scheduled. Latex gloves and trash bags will be provided, but please wear knee-boots, or hip-waders if you have them. No RSVP necessary. For more information, please visit www.manchesternh.gov/urbanponds or contact Jen Drociak at email@gmail.com or (603) ### - ####. We look forward to seeing you there!

Step 6: Conduct Your Clean-Up Event

A. Arrive Early: Consider arriving 15 minutes to one hour earlier than your volunteers so that you can set up at your check in location. Consider setting up the following: "Clean-Up Attendance Sheet", water and / or refreshments, first aid and safety, trash bags and clean-up supplies, organizational information (flyers, fact sheets, reports, etc.). Consider also walking around the location(s) to identify any new trash and / or safely concerns that may have accrued / arisen since your last visit.

The UPRP coordinator(s) typically meet on-site approximately 15-30 minutes in advance of volunteers to set up trash bags, latex gloves, and the "Clean-Up Attendance Sheet". We also survey the site to identify any new trash or safety hazards to relay to volunteers.

B. Welcome Your Volunteers and Ask Them to Sign-In: Welcome each volunteer upon arrival and ask that they sign a "Clean-Up Attendance Sheet" so that your group may account for number of volunteers and volunteer hours contributed to the clean-up event. Consider leaving the "Clean-Up Attendance Sheet" at the check-in location for those volunteers who may have to leave (and sign out) earlier than the full allotted time.



Manchester Urban Ponds Restoration Program
2016 Clean-Up Attendance Sheet

Location: ____________ Date: ________ Hours at Event: ______ # Volunteers: ______ # Volunteer Hours: ________

Name (Please Print)	Address	E-Mail	Time In	Time Out
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				

Number of Bags of Trash: ______ Other Items: ____________________

The UPRP "Clean-Up Attendance Sheet" typically notes the location and date of the event, and has room to tally the number of volunteers, number of volunteer hours, number of bags of trash and other debris. It also has fields for volunteers to print their name, address, and e-mail, and note the time they checked in, and the time they checked out.

C. Ask Volunteers to Sign a Liability Waiver and Photo-Release Form: Trash found in a waterbody will likely be dirty, rusty, slimy, and sharp. In addition, your group may find broken glass, hypodermic needles and hazardous wastes. Heavy items should not be lifted alone. Caution is needed when handling all trash in order to avoid cuts and other injuries. Consider asking volunteers to sign a liability waiver and photo-release form. These can be two documents, or combined into one. The form should explain any dangers associated with the clean-up event and reminds volunteers to act responsibly for their own safety. The form helps protect you and your organization from potential liability if a volunteer is injured. In addition, with their permission, it allows you to use photographs taken that day. Examples of these forms can be found on-line.

D. Introduce Yourself and Provide Opening Remarks: Introduce yourself, thank special guests, sponsors / project partners (who have helped by providing goods or services), and volunteers. If the media is there, they may want to interview you or for you to provide a brief quote. Consider preparing remarks ahead-of-time, and allowing any special guests to also provide opening remarks to the group.

The UPRP coordinators typically introduce themselves, and thank any special guests (city aldermen, city employees, etc.), sponsors (municipal and local), and volunteers themselves.

E. Provide Volunteers with a Brief Background / History of the Area(s): To acquaint new volunteers to your group / program and to the area, consider providing a brief background / history about the waterbody / area, distinguishing features, and its importance to the community. Consider showing volunteers a map of the waterbody and / or watershed. Also consider providing information such as points of interest, recent (or upcoming) restoration projects in the area, and / or information relative to water quality / monitoring, exotic species, other volunteer opportunities, etc.

Many of the UPRP volunteers are returning volunteers. However, with any new volunteers, we typically offer basic information on the program itself, as well as the watershed, inlet / outlet, history fun-facts, and any recent / upcoming restoration projects. We have fact sheets on each of our ponds on our website, which we can also direct them to for more information.

Manchester Urban Ponds Restoration Program

Nutts Pond Facts

- Namesake: Named after a local circus performer, "Commodore" George Washington Nutt
- Location: Driving Park Road, off of South Willow Street in south Manchester
- Type of Waterbody: Natural Pond fed by Tannery Brook
- Inlet/Outlet: Tannery Brook, flowing into Nutts Pond to the south of Home Depot, and emptying into the Merrimack River near the Riverwalk in downtown Manchester
- Watershed Area: 635 acres
- Waterbody Size: 16.1 acres
- Volume of Water: 260,500 m³
- Mean/Average Water Depth: 13.12 feet
- Maximum Water Depth: 30.18 feet
- Shoreline Length: 3,116 feet
- Elevation: 237 feet
- Uses: Paddling, fishing
- Public Boat Launch: Gravel; trailer or car-top
- Amenities: Precourt Park athletic fields
- Local Legend: "Commodore" Nutt the circus performer who toured with the P.T. Barnum Circus show with Tom Thumb

Manchester Urban Ponds Restoration Program

The History of Nutts Pond

"Commodore" Nutt

Manchester Urban Ponds Restoration Program

Nutts Pond Stormwater Best Management Practices (BMP) Summary

F. Provide Necessary Supplies to Your Volunteers: Ensure your volunteers have ample supplies for the duration of the clean-up event. If they did not bring their own work gloves, request that they take two pairs of Latex gloves (in case one pair rips), and more than one trash bag, depending on the designated location(s). If your group is also removing yard waste, provide your volunteers with rakes and lawn-waste bags. Request that they return any unused pair of gloves, trash bags, and any supplies to you at the end of the clean-up event. Consider also leaving supplies out in a designated location along with the "Clean-Up Attendance Sheet" for volunteers who may show up late.

Many of the UPRP bring their own work gloves. We then issue two pairs of Latex gloves to each volunteer as well as multiple trash bags, depending on the specific area they will be cleaning up. We request that all unused supplies be returned at the end of the clean-up.

G. Provide Your Volunteers with Instructions for the Clean-Up Event: Provide your volunteers with instructions for the clean-up event such as what they will be retrieving (large trash only, all trash, etc.) what not to pick up (hypodermic needles, cigarette butts, etc.), if they are to separate trash from recycling or not (in which case they may carry two bags at once – different colors may be helpful - one for trash and one for recycling), what is considered recyclable if they are separating recycling from trash (this differs in each community and some vendors may not accept unclean / dirty recyclables from clean-up events), etc. Also provide your volunteers with safety tips and a general schedule of the clean-up event including the location to reconvene at the end and where to place trash. Ensure everyone knows there to focus their efforts and then to stop.

The UPRP typically only picks up large items, and does not typically separate trash from recycling, due to limited means. However, we have done so in the past and have provided volunteers with two trash bags – one for recycling, and one for trash.

H. Make It Fun! Play One or More Games While You're at It! Why not make things fun while you're out there picking up trash? Consider playing one or more games (especially if some of the volunteers are children) such as a scavenger hunt, who can find the most interesting or unusual piece of trash, who can find the largest piece of trash, who collects the most trash, etc. Consider offering a prize and / or certificate to the winner(s) of one or more of the games you play.

The UPRP has, for many years, asked volunteers to find the "Most Interesting or Unusual Piece of Trash" at each clean-up event. At the end of the clean-up, volunteers will place their found items in one location for "judging" by the coordinator(s) of the clean-up event. Certificates and / or prizes have been awarded to the winner(s), and photos have been taken. We have found some really interesting an unusual pieces of trash over the years, and have kept a list!

I. Relinquish Groups of Volunteers / Group Leader(s) to Designated Area(s): If you are separating volunteers into more than one group for your clean-up event, relinquish the groups to their designated location(s). If you don't have a group leader for each group, relinquish them with their maps in hand. If you have a group leader be sure to introduce the volunteers in each group to their group leader before relinquishing them to their designated location(s). Remember to consider that not all locations may need the same number of volunteers.

The UPRP typically asks one or more returning volunteers if they would agree to be group leaders. Not all locations require the same amount of volunteers, however. This is decided based upon the area of the designated location(s), as well as the amount of trash to be removed in the designated location(s). For example, one small area along the shoreline may only require two volunteers, but a larger area in another location with a lot of trash may require 4-6 or more volunteers.

J. Reconvene at Initial Check-In Area at Designated Time: After the allotted period of time has elapsed for the clean-up event, reconvene at your initial check-in area. Account for all volunteers that did not sign out early.

The UPRP always meets at our initial check-in area. We then account for each group leader and group of volunteers (who did not sign out early) to ensure all have safely returned.

K. Count Full Bags of Trash (or Weigh All Trash): Count all full bags of trash that were collected and returned. If one or more bags are returned and are not considered full, consider consolidating them to make full bags of trash. That way, your measurements of "full bags" collected for this, and any other clean-up events, are consistently measured / counted. If your group has access to a scale, you consider weighing your bags of trash, and any other trash, to account for pounds of trash collected. Another option is to ask if the vendor who is charged with collecting the trash after the event can inform your group of the weight of the collection when the truck enters the scale at the weigh-station before drop-off at the refuse facility.

Since trash collected at UPRP clean-up events has not been weighed by a scale, and trash has been weighed by vendor truck only occasionally, to be consistent, we always count full bags at the site, and consolidate bags of trash that are returned not full in order to make full bags.

L. Account for and Count Other Items: Account for and count the quantity of other items of trash collected that cannot fit into bags.

The UPRP always accounts for and counts any trash that is collected that cannot be bagged. This typically includes vehicular tires, shopping carts, wood debris, construction debris, or any other items that have been illegally dumped.

***M.* Share the Data with Volunteers:** Once you have tallied the final numbers of bags of trash and other items collected during the clean-up event, announce them to your volunteers so they know just how much trash and other debris they removed from the area, know how important their contribution of time and efforts were, and have immediate results of their work!

N. Tally Final Numbers on Clean-Up Attendance Sheet: Once you have tallied everything collected, write these numbers on your "Clean-Up Attendance Sheet".

O. Take Photographs: To commemorate the success of your clean-up event, take a photo of the trash collected, and of the group of volunteers who helped collect it!

The UPRP always photographs the trash collected (in and out of bags), as well as takes a group photograph in front of or aside the trash collected.

P. Award a Prize, or Two, or Three: If you played one or more games during the clean-up event, consider awarding a certificate or prize to your winner(s) and photographing them with their winning piece of trash!

The UPRP has, for many years, asked volunteers to find the "Most Interesting or Unusual Piece of Trash" at each clean-up event. At the end of the clean-up, volunteers will place their found items in one location for "judging" by the coordinator(s) of the clean-up. Certificates and / or prizes have been awarded to the winner(s), and photos have been taken.

Q. Thank the Volunteers: Before parting ways, be sure to thank your volunteers for their assistance! Encourage them to volunteer again. Be sure to individually thank any special guests (aldermen / selectmen, city employees, media, etc.).

At the end of each clean-up event, the UPRP notes upcoming clean-up events in order to encourage volunteers to return for the next event.

Above Left: Volunteers at the 100th Cleanup of the Manchester Urban Ponds Restoration Program.

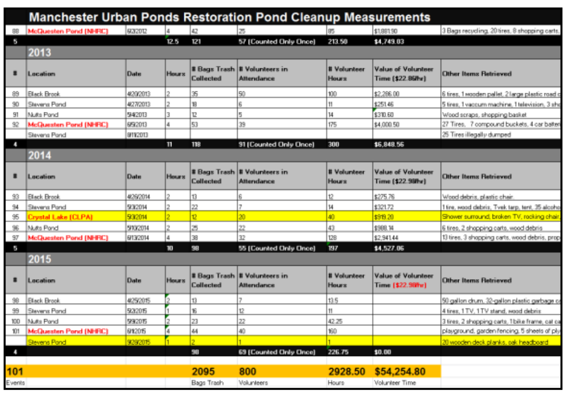
Above Right: Cake served to volunteers at the 100th official cleanup of the Manchester Urban Ponds Restoration Program .

R. Consider Having a Picnic / Cookout / or Lunch: If you have the financial means, consider having a picnic / cookout / lunch afterwards to celebrate your accomplishment. Or, consider soliciting local vendors for food donations in exchange for sponsor / partnership recognition at your clean-up event. If you're not able to make or supply lunch, consider encouraging volunteers to bring a brown-bag lunch for afterwards.

Step 7: Follow Up After the Clean-Up Event

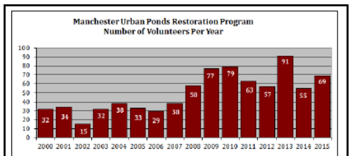
A. Update Your Electronic Records: Now is the time to transpose the information collected on the "Clean-Up Attendance Sheet" into an electronic record-retention system if you have access to one. Perhaps you have access to a database. If not, consider using a Microsoft Excel workbook / spreadsheet system to track measurements from your clean-up events. Now is also the time to update your existing e-mail distribution list with the names and e-mail addresses of those volunteers who participated in your clean-up event.

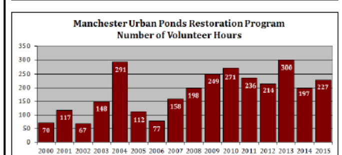
The UPRP has consistently used Microsoft Excel to track clean-up measurements. In the first worksheet of the workbook, we account for the number of our clean-up event, the location, date, hours spent at the event, numbers of bags of trash collected at the event, number of volunteers at the event, number of volunteer hours at the event, total value of volunteer time for the event, and other items retrieved at the event. For each year tracked, we created a "total" line with auto-calculations to account for the total of each year. To account for the value of volunteer time, we use figures taken from www.independentsector.org. In the second worksheet of the workbook, we account for pond cleanup attendees, where, for each clean-up event, we list the location, date, names (in alphabetical order), address, and hours at event. Similarly, for each year tracked, we created a "total" line. In the third worksheet of the workbook, we have created graphs based upon each year's total metrics. We then transpose these graphs to a Microsoft Word document, then an Adobe PDF document, and post on our website, and at the kiosks.

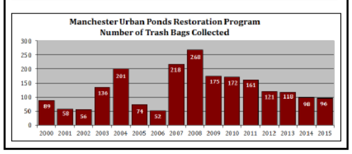


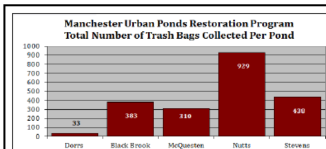
Manchester Urban Ponds Restoration Pond Cleanup Measurements

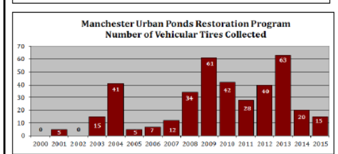
88	McQuesten Pond (NHRC)	6/2/2012	4	42	25	85	$1,881.90	3 Bags recycling, 20 tires, 8 shopping carts,
5			12.5	121	57 (Counted Only Once)	213.50	$4,749.03	
	2013							
#	Location	Date	Hours	# Bags Trash Collected	# Volunteers in Attendance	# Volunteer Hours	Value of Volunteer Time ($22.86/hr)	Other Items Retrieved
89	Black Brook	4/20/2013	2	35	50	100	$2,286.00	6 tires, 1 wooden pallet, 2 large plastic road c
90	Stevens Pond	4/27/2013	2	18	6	11	$251.46	5 tires, 1 vaccum machine, 1 television, 3 sho
91	Nutts Pond	5/4/2013	3	12	5	14	$310.60	Wood scraps, shopping basket
92	McQuesten Pond (NHRC)	6/9/2013	4	53	39	175	$4,000.50	27 Tires, 7 compound buckets, 4 car batter
	Stevens Pond	8/11/2013						25 Tires illegally dumped
4			11	118	91 (Counted Only Once)	300	$6,848.56	
	2014							
#	Location	Date	Hours	# Bags Trash Collected	# Volunteers in Attendance	# Volunteer Hours	Value of Volunteer Time ($22.98/hr)	Other Items Retrieved
93	Black Brook	4/26/2014	2	13	6	12	$275.76	Wood debris, plastic chair.
94	Stevens Pond	5/3/2014	2	22	7	14	$321.72	1 tire, wood debris, Tvek tarp, tent, 35 alcoho
95	Crystal Lake (CLPA)	5/3/2014	2	12	20	40	$919.20	Shower surround, broken TV, rocking chair,
96	Nutts Pond	5/10/2014	2	25	22	43	$988.14	6 tires, 2 shopping carts, wood debris
97	McQuesten Pond (NHRC)	6/13/2014	4	38	32	128	$2,941.44	13 tires, 3 shopping carts, wood debris, prop
5			10	98	55 (Counted Only Once)	197	$4,527.06	
	2015							
#	Location	Date	Hours	# Bags Trash Collected	# Volunteers in Attendance	# Volunteer Hours	Value of Volunteer Time ($22.98/hr)	Other Items Retrieved
98	Black Brook	4/25/2015	2	13	7	13.5		50 gallon drum, 32-gallon plastic garbage ca
99	Stevens Pond	5/2/2015	1	16	12	11		4 tires, 1 TV, 1 TV stand, wood debris
100	Nutts Pond	5/9/2015	2	23	22	42.25		3 tires, 2 shopping carts, 1 bike frame, cat ca
101	McQuesten Pond (NHRC)	6/1/2015	4	44	40	160		playground, garden fencing, 5 sheets of ply
	Stevens Pond	9/29/2015	1	2	1	1		20 wooden deck planks, oak headboard
4				98	69 (Counted Only Once)	226.75	$0.00	
101				2095	800	2928.50	$54,254.80	
Events				Bags Trash	Volunteers	Hours	Volunteer Time	

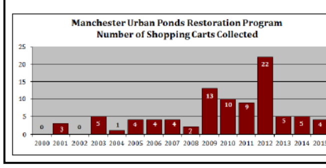












B. Follow Up With an E-mail or Thank-You Note: It is always nice to follow up with your new (and / or returning) volunteers by sending them a formal personalized thank-you via e-mail or US Postal Service. Besides, who doesn't like receiving a letter in the letter box, especially in this electronic day-in-age?

The UPRP, has, on occasion, sent personalized thank-you cards in the mail. Typically, however, we send a group thank-you via e-mail and attach photographs taken at the event(s), as well as re-cap tallies from the clean-up event(s).

C. Consider Writing an Article for Your Newsletter or the Newspaper: Consider writing an article for your newsletter, if you have one, or a local newsletter or newspaper, summarizing the event with photographs and tallies from the event. Volunteers who helped out at your clean-up event will feel proud of their accomplishment and the results. This is a good way to garner publicity about your group and its event as well as garner additional volunteers in the future.

The UPRP has often written newspaper articles and / or shared summary information about the clean-up events (at the end of the season) listing sponsors / project partners and volunteers, and including photographs of volunteers at the event, via an electronic newsletter.

From 2000 - 2005 **The Manchester Urban Ponds Restoration Program** (UPRP) was part of the Supplemental Environmental Projects Plan (SEPP) which was part of an agreement between the City of Manchester, NH Department of Environmental Services, and the US Environmental Protection Agency to address combined sewers in the City. Seven (7) waterbodies in Manchester have been evaluated and monitored for restoration potential. Specific restoration projects to meet the program's goals have also been identified, funded, and completed through this project. Since 2000, the Manchester Urban Ponds Restoration Program has organized 101 clean-up events. Over the past 15 years, 800 volunteers have spent 2,298.50 hours collecting 2,093 bags of trash! This does not include the items illegally "dumped" such as shopping carts (91), tires (388), car batteries, other car parts, construction debris, and other items. In addition, the value of volunteer time spent at these clean-ups has amounted to over $54,000 over the past 15 years! The Manchester Urban Ponds Restoration Program was awarded an EPA "Environmental Merit Award" in 2011. More information on the Manchester Urban Ponds Restoration Program can be found by visiting www.manchesternh.gov/urbanponds.

Jen Drociak lives in Manchester, NH and holds a Bachelor of Science degree in Environmental Conservation from the University of New Hampshire. She is employed with the New Hampshire Department of Environmental Services where she has worked as a program specialist for the Pollution Prevention Program, a restoration specialist for the NH Coastal Program where she established a monitoring program for pre- and post-restoration projects in NH's salt marshes, and as the Volunteer River Assessment Program Coordinator where she provided technical assistance to approximately 200 volunteers who collected water quality samples for surface water quality assessments on NH's rivers and streams. Jen has also worked for the Wastewater Engineering Bureau as a grants management specialist and is currently working for the Land Resources Management Bureau as a compliance specialist. Since 2000, Jen has also been involved with the Manchester Urban Ponds Restoration Program, and has served as acting coordinator since 2006 where she largely coordinates annual clean-up events and water quality monitoring.

Appendix H

Annual Reports and Reporting Requirements

Annual Reports

The Town will submit annual reports each year of the Small MS4 permit term, 90 days from the close of the reporting period (i.e., September 28). The reporting period will be a one-year period commencing on the permit effective date, and subsequent anniversaries thereof, except that the first annual report under the 2016 General Permit shall also cover the period from May 1, 2018 to the permit effective date, July 1, 2018. Under the 2016 General Permit, annual reports will consist of an assessment provided to EPA and more robust documentation outlined in the Checklist of Key Documentation.

Per Section 4.4.b of the 2016 General Permit, the annual reports shall contain the following information:

i. *A self-assessment review of compliance with the permit terms and conditions.*

ii. *An assessment of the appropriateness of the selected BMPs.*

iii. *The status of any plans or activities required by part 2.1 and/ or part 2.2, including:*
   - *Identification of all discharges determined to be causing or contributing to an exceedance of water quality standards and description of response including all items required by part 2.1.1;*
   - *For discharges subject to TMDL related requirements, identification of specific BMPs used to address the pollutant identified as the cause of impairment and assessment of the BMPs effectiveness at controlling the pollutant (part 2.2.1. and Appendix F) and any deliverables required by Appendix F;*
   - *For discharges to water quality limited waters a description of each BMP required by Appendix H and any deliverables required by Appendix H.*

iv. *An assessment of the progress towards achieving the measurable goals and objectives of each control measure in part 2.3 including:*
   - *Evaluation of the public education program including a description of the targeted messages for each audience; method of distribution and dates of distribution; methods used to evaluate the program; and any changes to the program.*
   - *Description of the activities used to promote public participation including documentation of compliance with state public notice regulations.*
   - *Description of the activities related to implementation of the IDDE program including: status of the map; status and results of the illicit discharge potential ranking and assessment; identification of problem catchments; status of all protocols described in part 2.3.4.(program responsibilities and systematic procedure); number and identifier of catchments evaluated; number and identifier of outfalls screened; number of illicit discharges located; number of illicit discharges removed; gallons of flow removed; identification of tracking indicators and measures of progress based on those indicators; and employee training.*
   - *Evaluation of the construction runoff management including number of project plans reviewed; number of inspections; and number of enforcement actions.*
   - *Evaluation of stormwater management for new development and redevelopment including status of ordinance development (2.3.6.a.ii.), review and status of the street design assessment (2.3.6.b.), assessments to barriers to green infrastructure (2.3.6.c), and retrofit inventory status (2.3.6.d.)*

- *Status of the O&M Programs required by part 2.3.7.a.*
- *Status of SWPPP required by part 2.3.7.b. including inspection results.*
- *Any additional reporting requirements in part 3.0.*

v. *All outfall screening and monitoring data collected by or on behalf of the permittee during the reporting period and cumulative for the permit term, including but not limited to all data collected pursuant to part 2.3.4. The permittee shall also provide a description of any additional monitoring data received by the permittee during the reporting period.*

vi. *Description of activities for the next reporting cycle.*

vii. *Description of any changes in identified BMPs or measurable goals.*

viii. *Description of activities undertaken by any entity contracted for achieving any measurable goal or implementing any control measure.*

MS4 Record Keeping Update
Winchendon, MA
November 2023

Tighe&Bond

The Town's Stormwater Management Program has been appended through the Permit term, including development of the following standalone reports. These reports are available from the Winchendon Department of Public Works.

The **IDDE Program** has been updated to include:

- Illicit Discharge Detection and Elimination Program, August 2019
- Winchendon's new General Bylaw, Article 31: *Stormwater Management,* was adopted at the May 17, 2021 Annual Town Meeting and approved by the Attorney General's Office. Part II of the Bylaw, *Discharges to the Municipal Separate Storm Sewer System*, includes provisions for regulating non-stormwater discharges to the MS4 and meets the requirements of the 2016 General Permit.
- 2019 Outfall Mapping Field Effort Summary, March 2020
- Winchendon MS4 Catchment Investigation Procedures, December 2022
- Phase I Mapping Field Effort Summary, September 2023
- Sanitary Sewer Overflow (SSO) inventory, updated annually
- IDDE employee training records, updated annually

The **Construction and Post-Construction Programs** have been updated to include:

- Winchendon's new General Bylaw, Article 31: *Stormwater Management*, requires the submission of as-built drawings in Section 31.19 as part of the Final Reports. Any Land Disturbance Permit obtained under the Bylaw must include measures to ensure adequate long-term operation and maintenance of stormwater management design features and BMPs and the Stormwater Authority may choose to impose requirements to ensure compliance. The Bylaw also contains construction, erosion and sediment control, and post-construction provisions. Associated *Stormwater Management* Regulations, which include written procedures for site inspections, enforcement of sediment and erosion control measures, and site plan review, were adopted on November 16, 2021. The new Bylaw and Regulations meet EPA's updated post-construction requirements in the 2016 General Permit.
- Town of Winchendon – Local Code Assessment, June 2023. A report assessing current street design and parking lot guidelines and other local requirements that affect the creation of impervious cover; as well as assessing existing local regulations to determine the feasibility of making green infrastructure and LID practices allowable. Mass Audubon's *By-Law Review for LID & Climate-Smart, Nature Based Solutions* is available electronically.

The **Municipal Good Housekeeping Program** has been updated to include:

- Good Housekeeping and Pollution Prevention Program for Municipal Operations and Maintenance, July 2021. Includes the Catch Basin Cleaning Optimization Plan in the Catch Basin Cleaning, Inspection, and Disposal SOP.
- While the Town of Winchendon Highway Garage Facility abuts the urbanized area on Glenallen Road, is not located within it and all drainage remains on-site. Therefore, Winchendon does not require a site-specific Stormwater Pollution Prevention Plan (SWPPP). This determination was submitted to EPA and MassDEP in the Year 3 annual report on September 28, 2021.

The **Lake Phosphorus Control Plan** has been updated to include:

- Lake Phosphorus Control Plan (LPCP) for Winchendon's Lakes and Ponds in Millers River Basin – *Legal Analysis*, June 2021
- Lake Phosphorus Control Plan (LPCP) for Winchendon's Lakes and Ponds in Millers River Basin, June 2022 – includes Legal Analysis, Funding Source Assessment, LPCP Scope (LPCP Area), and Phosphorus Loadings

The **SWMP** is updated to include the following information to address Section 2.2, Discharges to Certain Impaired Waters, and Section 3.0, Additional Requirements for Discharges to Surface Drinking Water Supplies and their Tributaries, of the General Permit:

- Winchendon's NOI and Permit Years 1 and 2 Annual Reports listed potential receiving waters and impairments based on the water quality limited waters within the Town's urbanized area that were included in the 2014 303(d) Integrated List. The Town has evaluated changes to the impairments and/or receiving waters based on the final 2016 303(d) Integrated List and field mapping improvements completed. Based on this analysis, it was determined that the requirements of Appendix H, Parts II, III, and V for phosphorus, bacteria, and solids, respectively, are no longer applicable to Winchendon because the impairments for Millers River (MA35-01) and Otter River (MA35-08) were removed from the 2016 303(d) Integrated List. Receiving waters were also updated based on field work completed in Permit Years 1 and 3, which removed additional waterbodies as potential receiving waters from the NOI. These determinations were submitted to EPA and MassDEP in the Year 2 annual report on September 2, 2020 and Year 3 annual report on September 28, 2021.
- The Town has evaluated changes to the impairments and/or receiving waters based on the 2018/2020 303(d) Integrated List. This list adds Ambient Bioassays – Chronic Aquatic Toxicity as an impairment to Millers River (MA35-01). There are no other changes to the Town's receiving waters and associated impairments based on the 2018/2020 303(d) List. Winchendon is not subject to any impairments listed in Appendix H and there have been no changes to the TMDLs. This determination was submitted to EPA and MassDEP in the Year 4 annual report on September 28, 2022.
- EPA's SWMP template does not include provisions to address the surface drinking water supply requirement. However, this is not applicable to Winchendon because there are no surface drinking water supplies or tributaries to surface drinking water supplies within the MS4.
- The Town has evaluated changes to the impairments and/or receiving waters based on the 2022 303(d) Integrated List. There were no changes to Appendix H requirements based on this evaluation.

Reporting includes:

- Year 1 Annual Report
- Year 2 Annual Report
- Year 3 Annual Report and attachments:
    - Catch Basin Cleaning, Inspection, and Disposal SOP
    - Outfall inventory and inspection data *(available electronically)*
    - Lake Phosphorus Control Plan (LPCP) for Winchendon's Lakes and Ponds in Millers River Basin – *Legal Analysis*, June 2021

- Year 4 Annual Report and attachments:
    - Delegation of Authority Letter
    - SSO Inventory
    - Catch Basin Cleaning, Inspection, and Disposal SOP
    - Street Sweeping and Town-Owned Parking Lots SOP
    - Snow Removal and Deicing SOP
    - Outfall Inventory *(available electronically)*
- Year 5 Annual Report and attachments:
    - Summary of Winchendon's TMDLs and Impaired Waters
    - Phase I Mapping Field Effort Summary, September 2023
    - Lake Phosphorus Control Plan (LPCP) for Winchendon's Lakes and Ponds in Millers River Basin, June 2022
    - BMP Nutrient Removal Estimate Calculations

Permit Year 1

(May 1, 2018 – June 30, 2019)

Year 1 Annual Report
Massachusetts Small MS4 General Permit
New Permittees
Reporting Period: May 1, 2018-June 30, 2019

Please DO NOT attach any documents to this form. Instead, attach all requested documents to an email when submitting the form

Unless otherwise noted, all fields are required to be filled out. If a field is left blank, it will be assumed the requirement or task has not been completed.

Part I: Contact Information

Name of Municipality or Organization: Town of Winchendon

EPA NPDES Permit Number: MAR041244

Primary MS4 Program Manager Contact Information

Name: Albert Gallant   Title: DPW Director

Street Address Line 1: 109 Front Street

Street Address Line 2:

City: Winchendon   State: MA   Zip Code: 01475

Email: agallant@townofwinchendon.com   Phone Number: (978) 297-0170

Fax Number:

Stormwater Management Program (SWMP) Information

SWMP Location (web address): https://www.townofwinchendon.com/planning-development/pages/winchendon-stormwater-program

Date SWMP was Last Updated: June 2019

If the SWMP is not available on the web please provide the physical address and an explanation of why it is not posted on the web:

Part II: Self Assessment

Check off all requirements below that have been completed. ***By checking each box you are certifying that you have completed that permit requirement fully.*** *If you have not completed a requirement leave the box unchecked. Additional information will be requested in later sections.*

Year 1 Requirements

☒ Develop and begin public education and outreach program

Annual Requirements

☒ Annual opportunity for public participation in review and implementation of SWMP

☒ Comply with State Public Notice requirements

☒ Keep records relating to the permit available for 5 years and make available to the public

☒ Properly store and dispose of catch basin cleanings and street sweepings so they do not discharge to receiving waters

Use the box below to input additional details on any unchecked boxes above or any additional information you would like to share as part of your self assessment:

The Town has begun working on requirements not due until later Permit Years. In Permit Year 1, the Town of Winchendon developed a written IDDE plan, which will be modified and updated throughout the Permit Term as the IDDE program is implemented. See Part IV for additional information on public education and outreach and outfall mapping completed in Permit Year 1.

Part III: Receiving Waters/Impaired Waters/TMDL

Have you made any changes to your lists of receiving waters, outfalls, or impairments since the NOI was submitted?

Yes ☒ No ☐

If yes, describe below, including any relevant impairments or TMDLs:

During Permit Year 1, the Town has completed field work to locate and map outfalls and interconnections. 41 new outfalls and 2 interconnections were added to the MS4 mapping. Receiving waters have not been assigned yet. This will be completed as part of the Phase I mapping due in Permit Year 5.

Part IV: Minimum Control Measures

Part IV includes some of the metrics that will be required in upcoming annual reports. For this annual report, these metrics are optional for new permittees; please fill out any of the metrics below that you have started. Then, proceed to Part V.

MCM1: Public Education

Number of educational messages completed during the reporting period: 2

Below, report on the educational messages completed during the first year. For the measurable goal(s) please describe the method/measures used to assess the overall effectiveness of the educational program.

BMP: 1A: Education and Outreach to Residents (Multi-media Methods)

Message Description and Distribution Method:

Educational materials on the MS4 Program, proper pet waste management, and proper fertilizer use were displayed at a Board of Selectmen meeting, posted on the Town website, and available for viewing in Town Hall offices. Additionally, a link to these materials was posted on the Town's Facebook page. These brochures helped satisfy the annual education requirements of Appendix H for discharges to waters impaired for phosphorus and bacteria, as well as Appendix F for discharges to waters subject to TMDLs for nitrogen and phosphorus.

Targeted Audience: Residents

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

Approximately 15 residents attended the Board of Selectmen meeting and the brochures continue to be on display at Town Hall. The Facebook post received 4 likes and 3 shares.

Message Date(s): June 2019

Message Completed for: Appendix F Requirements ☒ Appendix H Requirements ☒

Was this message different than what was proposed in your NOI? Yes ☐ No ☒

If yes, describe why the change was made:

BMP: 1A: Education and Outreach to Residents (Multi-media Methods)

Message Description and Distribution Method:

The Town has installed signs and trash barrels promoting proper pet waste management at locations around Town, including the bike path and parks. The DPW maintains the barrels for trash and pet waste on a weekly basis.

Targeted Audience: Residents

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

The pet waste signs reach all users of the bike path and parks.

Message Date(s): Ongoing

Message Completed for: Appendix F Requirements ☐ Appendix H Requirements ☒

Was this message different than what was proposed in your NOI? Yes ☐ No ☒

If yes, describe why the change was made:

Add an Educational Message

MCM2: Public Participation

Describe the opportunity provided for public involvement in the development of the Stormwater Management Program (SWMP) during the reporting period:

The Stormwater Management Plan (SWMP) was posted for public review and made publicly available on the Town's website. The SWMP was also presented at a Board of Selectman meeting on June 24, 2019 where public comments and feedback were solicited. The Town followed Massachusetts Public Notice requirements and posted this meeting on June 10, 2019.

Was this opportunity different than what was proposed in your NOI? Yes ☐ No ☒

Describe any other public involvement or participation opportunities conducted during the reporting period:

The Town's Annual Earth Day Cleanup was held on April 27, 2019 and encouraged residents of Winchendon to pick up trash around the Town. Bags, gloves, and a dumpster were provided by the Town and its contractors.

Winchendon residents can properly dispose of household hazardous waste at the transfer station from April 1 through October 31 every year.

MCM3: Illicit Discharge Detection and Elimination (IDDE)

Sanitary Sewer Overflows (SSOs)

Below, report on the number of SSOs identified in the MS4 system and removed during this reporting period.

Number of SSOs identified: 0

Number of SSOs removed: 0

Below, report on the total number of SSOs identified in the MS4 system and removed to date. At a minimum, report SSOs identified since 2013.

Total number of SSOs identified: 5

Total number of SSOs removed: 5

MS4 System Mapping

Describe the status of your MS4 map, including any progress made during the reporting period (phase I map due in year 5):

Winchendon has begun to satisfy requirements under Phase I, Phase II, and other recommended mapping components of the MS4 permit. Prior to the 2016 General Permit going into effect, the Town's stormwater map included drain manholes, catch basins, pipes, and culverts. Outfall and interconnection mapping within the MS4 has begun. Outfall receiving waters and their associated impairments will be identified as part of the Phase I mapping due in Permit Year 5.

Screening of Outfalls/Interconnections

If conducted, please submit any outfall monitoring results from this reporting period. Outfall monitoring results should include the date, outfall/interconnection identifier, location, weather conditions at time of sampling, precipitation in previous 48 hours, field screening parameter results, and results from all analyses.

- ○ The outfall screening data is attached to the email submission
- ◉ The outfall screening data can be found at the following website:

N/A

Below, report on the number of outfalls/interconnections screened during this reporting period.

Number of outfalls screened: 0

Below, report on the percent of total outfalls/interconnections screened to date.

Percent of total outfalls screened: 0

Catchment Investigations

If conducted, please submit all data collected during this reporting period as part of the dry and wet weather investigations. Also include the presence or absence of System Vulnerability Factors for each catchment.

- ○ The catchment investigation data is attached to the email submission
- ○ The catchment investigation data can be found at the following website:

N/A

Below, report on the number of catchment investigations completed during this reporting period.

Number of catchment investigations completed this reporting period: 0

Below, report on the percent of catchments investigated to date.

Percent of total catchments investigated: 0

Optional: Provide any additional information for clarity regarding the catchment investigations below:

IDDE Progress

If illicit discharges were found, please submit a document describing work conducted over this reporting period, and cumulative to date, including location source; description of the discharge; method of discovery; date of discovery; and date of elimination, mitigation, or enforcement OR planned corrective measures and schedule of removal.

- ○ The illicit discharge removal report is attached to the email submission
- ○ The illicit discharge removal report can be found at the following website:

N/A

Below, report on the number of illicit discharges identified and removed, along with the volume of sewage removed during this reporting period.

Number of illicit discharges identified: 0

Number of illicit discharges removed: 0

Estimated volume of sewage removed: N/A [UNITS]

Below, report on the total number of illicit discharges identified and removed to date. At a minimum, report on the number of illicit discharges identified and removed since the effective date of the permit.

Total number of illicit discharges identified: 0

Total number of illicit discharges removed: 0

Optional: Provide any additional information for clarity regarding illicit discharges identified, removed, or planned to be removed below:

Employee Training

Describe the frequency and type of employee training if conducted during the reporting period:

An employee training was held on June 20, 2019, which reviewed the overall MS4 program, illicit discharges to the drain, IDDE Program responsibilities, and reporting.

MCM4: Construction Site Stormwater Runoff Control

Below, report on the construction site plan reviews, inspections, and enforcement actions completed during this reporting period.

Number of site plan reviews completed:

Number of inspections completed:

Number of enforcement actions taken:

MCM5: Post-Construction Stormwater Management in New Development and Redevelopment

Ordinance Development

Describe the status of the post-construction ordinance required to be complete in year 2 of the permit term:

The post-construction bylaw is not required to be completed until the end of Permit Year 3. The Town is reviewing existing bylaws and regulations and determine if updates or additions are needed to meet the requirements of the General Permit.

As-built Drawings

Describe the status of the measures the MS4 has utilized to require the submission of as-built drawings and ensure long term operation and maintenance of completed construction sites required to be complete in year 2 of the permit term:

Section 6.5.2 of the Town's Rules and Regulations for the Review and Approval of Site Plans and Site Development requires the submission of as-built drawings. The Town's Low Impact Development (LID) Bylaw aims to establish maintenance provisions to ensure that stormwater treatment practices will continue to function as designed. The Town will review existing bylaws and regulations by the end of Permit Year 3 to determine whether updates or additions are needed in accordance with the General Permit schedule.

Street Design and Parking Lots Report

Describe the status of the street design and parking lots assessment due in year 4 of the permit term, including any planned or completed changes to local regulations and guidelines:

Preparation for the Street Design and Parking Lots Report has not yet begun as this requirement is due in Permit Year 6.

Green Infrastructure Report

Describe the status of the green infrastructure report due in year 4 of the permit term, including the findings and progress towards making the practice allowable:

Preparation for the Green Infrastructure Report has not yet begun as this requirement is due in Permit Year 6.

Retrofit Properties Inventory

Describe the status of the inventory, due in year 4 of the permit term, of permittee-owned properties that could be modified or retrofitted with BMPs to mitigate impervious areas and report on any properties that have been modified or retrofitted:

Preparation for the Retrofit Properties Inventory has not yet begun as this requirement is due in Permit Year 6.

MCM6: Good Housekeeping

Catch Basin Cleaning

Describe the status of the catch basin cleaning optimization plan:

Preparation for this plan has not yet begun as this requirement is due in Permit Year 4.

If complete, attach the catch basin cleaning optimization plan or the schedule to gather information to develop the optimization plan:

- ○ The catch basin cleaning optimization plan or schedule is attached to the email submission
- ○ The catch basin cleaning optimization plan or schedule can be found at the following website:

N/A

Below, report on the number of catch basins inspected and cleaned, along with the total volume of material removed from the catch basins during this reporting period.

Number of catch basins inspected:

Number of catch basins cleaned:

Total volume or mass of material removed from all catch basins: [UNITS]

Below, report on the total number of catch basins in the MS4 system, if known.

Total number of catch basins: 630

If applicable:

Report on the actions taken if a catch basin sump is more than 50% full during two consecutive routine inspections/cleaning events:

Street Sweeping

Describe the status of the written procedures for sweeping streets and municipal-owned lots:

Written procedures for street sweeping are not required to be completed until the end of Permit Year 4. The Town will review existing street sweeping practices and establish written procedures.

Report on street sweeping completed during the reporting period using one of the three metrics below.

○ Number of miles cleaned:

○ Volume of material removed: [UNITS]

○ Weight of material removed: [UNITS]

If applicable:

For rural uncurbed roadways with no catch basins, describe the progress of the inspection, documentation, and targeted sweeping plan:

Winter Road Maintenance

Describe the status of the written procedures for winter road maintenance including the storage of salt and sand:

Winchendon stores deicing materials in a covered storage shed. The Town will review existing winter road maintenance practices and establish written procedures by the end of Permit Year 4 in accordance with the General Permit schedule.

Inventory of Permittee-Owned Properties

Describe the status of the inventory, due in year 2 of the permit term, of permittee-owned properties, including parks and open spaces, buildings and facilities, and vehicles and equipment, and include any updates:

The inventory of permittee-owned properties is not required to be completed until the end of Permit Year 4.

O&M Procedures for Parks and Open Spaces, Buildings and Facilities, and Vehicles and Equipment

Describe the status of the operation and maintenance procedures, due in year 2 of the permit term, of permittee-owned properties (parks and open spaces, buildings and facilities, vehicles and equipment) and include maintenance activities associated with each:

The operation and maintenance procedures are not required to be completed until the end of Permit Year 4. As the Town prepares the Inventory of Town-Owned Properties, they will concurrently prepare O&M procedures associated with the properties included in the inventory.

Stormwater Pollution Prevention Plan (SWPPP)

Describe the status of any SWPPP, due in year 2 of the permit term, for permittee-owned or operated facilities including maintenance garages, public works yards, transfer stations, and other waste handling facilities where pollutants are exposed to stormwater:

The Town will identify what properties and facilities are in need of a SWPPP and will prepare these in accordance with the General Permit by the end of Permit Year 4.

Below, report on the number of site inspections for facilities that require a SWPPP completed during this reporting period.

Number of site inspections completed: N/A

Describe any corrective actions taken at a facility with a SWPPP:

N/A

O&M Procedures for Stormwater Treatment Structures

Describe the status of the written procedure for stormwater treatment structure maintenance:

Written procedures for operation and maintenance of stormwater treatment structures are not required to be completed until the end of Permit Year 4. The Town will review existing operations and maintenance procedures for stormwater treatment structures and establish written procedures.

Part V: Additional Information

Monitoring or Study Results

Results from any other stormwater or receiving water quality monitoring or studies conducted during the reporting period not otherwise mentioned above, where the data is being used to inform permit compliance or permit effectiveness must be attached.

- (●) Not applicable
- ( ) The results from additional reports or studies are attached to the email submission
- ( ) The results from additional reports or studies can be found at the following website(s):

If such monitoring or studies were conducted on your behalf or if monitoring or studies conducted by other entities were reported to you, a brief description of the type of information gathered or received shall be described below:

Additional Information

Optional: Enter any additional information relevant to your stormwater management program implementation during the reporting period. Include any BMP modifications made by the MS4 if not already discussed above:

Activities Planned for Next Reporting Period

Please confirm that your SWMP has been, or will be, updated to comply with all applicable permit requirements including but not limited to the year 2 requirements summarized below. (Note: impaired waters and TMDL requirements are not listed below)

Yes, I agree ☒

Annual Requirements

- Annual report submitted and available to the public
- Annual opportunity for public participation in review and implementation of SWMP
- Keep records relating to the permit available for 5 years and make available to the public
- Properly store and dispose of catch basin cleanings and street sweepings so they do not discharge to receiving waters
- Continue public education and outreach program

Provide any additional details on activities planned for permit year 2 below:

Part VI: Certification of Small MS4 Annual Report 2019

40 CFR 144.32(d) Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: Keith R. Hickley

Title: Town Manager

Signature: KRH

[Signatory may be a duly authorized representative]

Date: 9/24/19

Permit Year 2

(July 1, 2019 – June 30, 2020)

Year 2 Annual Report
Massachusetts Small MS4 General Permit
New Permittees
Reporting Period: July 1, 2019-June 30, 2020

Please DO NOT attach any documents to this form. Instead, attach all requested documents to an email when submitting the form

Unless otherwise noted, all fields are required to be filled out. If a field is left blank, it will be assumed the requirement or task has not been completed. Please ONLY report on activities between July 1, 2019 and June 30, 2020 unless otherwise requested.

Part I: Contact Information

Name of Municipality or Organization: Town of Winchendon

EPA NPDES Permit Number: MAR041244

Primary MS4 Program Manager Contact Information

Name: Albert Gallant Title: DPW Director

Street Address Line 1: 109 Front Street

Street Address Line 2:

City: Winchendon State: MA Zip Code: 01475

Email: agallant@townofwinchendon.com Phone Number: (978) 297-0170

Stormwater Management Program (SWMP) Information

SWMP Location (web address): https://www.townofwinchendon.com/public-works/pages/winchendon-stormwater-program

Date SWMP was Last Updated: September 2019

If the SWMP is not available on the web please provide the physical address:

Part II: Self-Assessment

Check off all requirements below that have been completed. ***By checking each box you are certifying that you have completed that permit requirement fully.*** *If you have not completed a requirement leave the box unchecked. Additional information will be requested in later sections.*

Annual Requirements

- ☒ Provided an opportunity for public participation in review and implementation of SWMP and complied with State Public Notice Requirements
- ☒ Kept records relating to the permit available for 5 years and made available to the public
- ☒ Properly stored and disposed of catch basin cleanings and street sweepings so they did not discharge to receiving waters

Optional: If you would like to describe progress made on any incomplete requirements listed above, provide any additional information for your self-assessment, and/or if any of the above year 2 requirements could not be completed due to the impacts of COVID-19, please identify the requirement that could not be completed, any actions taken to attempt to complete the requirement, and reason the requirement could not be completed below:

Part III: Receiving Waters/Impaired Waters/TMDL

Have you made any changes to your lists of receiving waters, outfalls, or impairments since the NOI was submitted? Make sure you are referring to the most recent EPA approved Section 303(d) Impaired Waters List which can be found here: https://www.epa.gov/tmdl/region-1-impaired-waters-and-303d-lists-state

- (•) Yes
- ( ) No

If yes, describe below, including any relevant impairments or TMDLs:

The Town has made significant progress towards locating, mapping, and inventorying MS4 outfalls and interconnections. In both Permit Year 1 and August 2020 (Permit Year 3), the Town's consultant completed desktop exercises to digitize drainage plans and completed field work to GPS-locate stormwater structures. However, receiving waters have not been identified yet, as this is due in Permit Year 5 for new permittees. The Town anticipates working with a consultant to assign receiving waters for MS4 outfalls and interconnections in Fall 2020.

Winchendon's NOI listed potential receiving waters based on the water quality limited waters within the Town's urbanized area that were included in the 2014 303(d) List. The list below identifies any changes to the potential impairments based on the final 2016 303(d) List. The Town's impairments and TMDLs will be refined once receiving waters have been assigned.

-Millers River (MA35-01): Lack of Coldwater Assemblage and Temperature impairments were added; Fecal Coliform, phosphorus, and PCB in Fish Tissue impairments were removed.
-Millers River (MA35-20): Lack of Coldwater Assemblage and Temperature impairments were added.
-Otter River (MA35-08): Total Dissolved Solids, Aquatic Macroinvertebrate Bioassessments, Fecal Coliform, Fishes Bioassessments, Nutrient/Eutrophication Biological Indicators, Turbidity, and Taste and Odor impairments were removed.
-Whitney Pond (MA35101): Aquatic Plants (Macrophytes) impairment was added.
-Whites Mill Pond (MA35099): Aquatic Plants (Macrophytes) impairment was added; Mercury in Fish Tissue impairment was removed.

Part IV: Minimum Control Measures

Part IV includes some of the metrics that will be required in upcoming annual reports. For this annual report, these metrics are optional for new permittees; please fill out any of the metrics below that you have started within this reporting period. Then, proceed to Part V.

MCM1: Public Education

Number of educational messages completed **during this reporting period**: 3

*Below, report on the educational messages completed **during this reporting period**. For the measurable goal(s) please describe the method/measures used to assess the overall effectiveness of the educational program.*

BMP:Education and Outreach to Residents and Businesses (Multi-media Methods)

Message Description and Distribution Method:

Information regarding proper lawn maintenance, the benefits of rain gardens, and how wetlands work was posted to the Town of Winchendon Facebook page. The lawn care post included a link to the Town's MS4 Public Education webpage, where residents and businesses could obtain additional information about the topics.

Targeted Audience: Residents and Businesses, institutions and commercial facilities

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

The Facebook posts received more than 700 views and a total of 33 likes, 4 comments, and 4 shares.

Message Date(s): Lawn care: May 5, 2020
Rain gardens: May 7, 2020
Wetlands: May 14, 2020

Message Completed for: Appendix F Requirements ☒ Appendix H Requirements ☒

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

BMP:Education and Outreach to Residents and Businesses (Multi-media Methods)

Message Description and Distribution Method:

Educational information and materials regarding the MS4 Program, proper lawn care, and proper fertilizer and other lawn chemical use were posted on the Town's Stormwater Program and MS4 Public Education webpages during Permit Year 2.

Targeted Audience: Residents and Businesses, institutions and commercial facilities

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

The Winchendon Stormwater Program webpage received 73 views and the MS4 Public Education webpage received 49 views during Permit Year 2.

Message Date(s): Ongoing

Message Completed for: Appendix F Requirements ☒ Appendix H Requirements ☒

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

BMP:Education and Outreach to Residents (Multi-media Methods)

Message Description and Distribution Method:

Educational information regarding proper septic system maintenance was posted on the Town's Board of Health Title V webpage during Permit Year 2.

Targeted Audience: Residents

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

The Board of Health Title V webpage received 197 views during Permit Year 2.

Message Date(s): Ongoing

Message Completed for: Appendix F Requirements ☐ Appendix H Requirements ☒

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

Add an Educational Message

MCM2: Public Participation

Describe the opportunity provided for public involvement in the development of the Stormwater Management Program (SWMP) **during this reporting period**:

The Stormwater Management Plan (SWMP) and Year 1 Annual Report were publicly available on the Town's website.

Was this opportunity different than what was proposed in your NOI? Yes ○ No ◉

Describe any other public involvement or participation opportunities conducted **during this reporting period**:

Winchendon residents can properly dispose of household hazardous waste at the transfer station from October 1 through May 31 every year.

The Town-sponsored annual Earth Day Clean Up was scheduled for April 25, 2020 but was unable to be held due to COVID-19. The event has been postponed to a later date to be determined.

MCM3: Illicit Discharge Detection and Elimination (IDDE)

Sanitary Sewer Overflows (SSOs)

Check off the box below if the statement is true.

☐ This SSO section is NOT applicable because we DO NOT have sanitary sewer

*Below, report on the number of SSOs identified in the MS4 system and removed **during this reporting period**.*

Number of SSOs identified:

Number of SSOs removed:

*Below, report on the total number of SSOs identified in the MS4 system and removed to date. At a minimum, report SSOs identified **since the effective date of the permit (July 1, 2018)**.*

Total number of SSOs identified:

Total number of SSOs removed:

MS4 System Mapping

Below, check all that apply.

The following elements of the Phase I map have been completed:

☐ Outfalls and receiving waters

☐ Open channel conveyances

☐ Interconnections

☐ Municipally-owned stormwater treatment structures

☐ Waterbodies identified by name and indication of all use impairments

☐ Initial catchment delineations

Describe any additional progress you made on your map during this reporting period or provide additional status information regarding your map:

The Town has made significant progress on mapping the Phase I, Phase II, and some recommended mapping elements. Winchendon has worked with a consultant to digitize drainage plans to add outfalls, catch basins, manholes, pipes, swales, and BMPs to the GIS mapping. Field work has been completed to map additional stormwater infrastructure and improve the outfall and interconnection inventory. The Town anticipates identifying receiving waters, identifying additional Town-owned BMPs, and completing the initial catchment delineations in Fall 2020.

Screening of Outfalls/Interconnections

*If conducted, please submit any outfall monitoring results **from this reporting period**. Outfall monitoring results should include the date, outfall/interconnection identifier, location, weather conditions at time of sampling, precipitation in previous 48 hours, field screening parameter results, and results from all analyses.*

○ The outfall screening data is attached to the email submission
◉ The outfall screening data can be found at the following website:

N/A

*Below, report on the number of outfalls/interconnections screened **during this reporting period**.*

Number of outfalls screened:

Catchment Investigations

*If conducted, please submit all data collected **during this reporting period** as part of the dry and wet weather investigations. Also include the presence or absence of System Vulnerability Factors for each catchment.*

○ The catchment investigation data is attached to the email submission
◉ The catchment investigation data can be found at the following website:

N/A

*Below, report on the number of catchment investigations completed **during this reporting period**.*

Number of catchment investigations completed this reporting period:

*Below, report on the percent of catchments investigated **to date**.*

Percent of total catchments investigated:

Optional: Provide any additional information for clarity regarding the catchment investigations below:

IDDE Progress

If illicit discharges were found, please submit a document describing work conducted over this reporting period, and cumulative to date, including location source; description of the discharge; method of discovery; date of discovery; and date of elimination, mitigation, or enforcement OR planned corrective measures and schedule of removal.

○ The illicit discharge removal report is attached to the email submission
○ The illicit discharge removal report can be found at the following website:

N/A

Below, report on the number of illicit discharges identified and removed, along with the volume of sewage removed ***during this reporting period****.*

Number of illicit discharges identified:

Number of illicit discharges removed:

Estimated volume of sewage removed: gallons/day

Below, report on the total number of illicit discharges identified and removed to date. At a minimum, report on the number of illicit discharges identified and removed ***since the effective date of the permit (July 1, 2018)****.*

Total number of illicit discharges identified:

Total number of illicit discharges removed:

Optional: Provide any additional information for clarity regarding illicit discharges identified, removed, or planned to be removed below:

Employee Training

Describe the frequency and type of employee training if conducted **during this reporting period**:

A training for DPW employees was held on August 14, 2020, which reviewed the overall MS4 program, illicit discharges to the drain, IDDE Program responsibilities, and reporting, as well as municipal good housekeeping topics. The training was intended to be held during Permit Year 2 but was delayed due to COVID-19.

MCM4: Construction Site Stormwater Runoff Control

Below, report on the construction site plan reviews, inspections, and enforcement actions completed ***during this reporting period****.*

Number of site plan reviews completed:

Number of inspections completed:

Number of enforcement actions taken:

MCM5: Post-Construction Stormwater Management in New Development and Redevelopment

Ordinance Development

Describe the status of the post-construction ordinance required to be complete by year 3 of the permit term:

The Town is in the process of reviewing existing bylaws and regulations and anticipates completing any needed updates or additions to meet the requirements of the General Permit in Permit Year 3.

As-built Drawings

Describe the status of the measures the MS4 has utilized to require the submission of as-built drawings and ensure long term operation and maintenance of completed construction sites:

Section 6.5.2 of the Town's Rules and Regulations for the Review and Approval of Site Plans and Site Development requires the submission of as-built drawings. The Town's Low Impact Development (LID) Bylaw aims to establish maintenance provisions to ensure that stormwater treatment practices will continue to function as designed. The Town is in the process of reviewing existing bylaws and regulations and anticipates completing any needed updates or additions to meet the requirements of the General Permit in Permit Year 3.

Street Design and Parking Lots Report

Describe the status of the street design and parking lots assessment including any planned or completed changes to local regulations and guidelines:

Preparation for the Street Design and Parking Lots Report has not yet begun as this requirement is due in Permit Year 6.

Green Infrastructure Report

Describe the status of the green infrastructure report, including the findings and progress towards making the practice allowable:

Preparation for the Green Infrastructure Report has not yet begun as this requirement is due in Permit Year 6.

Retrofit Properties Inventory

Describe the status of the inventory of permittee-owned properties that could be modified or retrofitted with BMPs to mitigate impervious areas and report on any properties that have been modified or retrofitted:

Preparation for the Retrofit Properties Inventory has not yet begun as this requirement is due in Permit Year 6.

MCM6: Good Housekeeping

Catch Basin Cleaning

Describe the status of the catch basin cleaning optimization plan:

Included in the August 2020 proposed catch basin SOP, which will be adopted by the Selectmen in Year 3.

If complete, attach the catch basin cleaning optimization plan or the schedule to gather information to develop the optimization plan:

- (●) The catch basin cleaning optimization plan or schedule is attached to the email submission
- ( ) The catch basin cleaning optimization plan or schedule can be found at the following website:

*Below, report on the number of catch basins inspected and cleaned, along with the total volume of material removed from the catch basins **during this reporting period**.*

Number of catch basins inspected:

Number of catch basins cleaned:

Total volume or mass of material removed from all catch basins: [Select Units]

Below, report on the total number of catch basins in the MS4 system, if known.

Total number of catch basins: 630

If applicable:

Report on the actions taken if a catch basin sump is more than 50% full during two consecutive routine inspections/cleaning events:

Street Sweeping

Describe the status of the written procedures for sweeping streets and municipal-owned lots:

The Town has developed a proposed standard operating procedure for sweeping streets and Town-owned parking lots. The SOP was finalized in August 2020 and will be adopted by the Board of Selectmen in Permit Year 3.

Report on street sweeping completed during the reporting period using one of the three metrics below.

○ Number of miles cleaned:

○ Volume of material removed: [Select Units]

○ Weight of material removed: [Select Units]

If applicable:

For rural uncurbed roadways with no catch basins, describe the progress of the inspection, documentation, and targeted sweeping plan:

O&M Procedures and Inventory of Permittee-Owned Properties

Below, check all that apply.

The following permittee-owned properties have been inventoried:

- ☐ Parks and open spaces
- ☐ Buildings and facilities
- ☐ Vehicles and equipment

The following O&M procedures for permittee-owned properties have been completed:

- ☐ Parks and open spaces
- ☐ Buildings and facilities
- ☐ Vehicles and equipment

Winter Road Maintenance

Describe the status of the written procedures for winter road maintenance including the storage of salt and sand:

Winchendon stores deicing materials in a covered storage shed. The Town will review existing winter road maintenance practices and establish written procedures by the end of Permit Year 4 in accordance with the General Permit schedule.

Stormwater Pollution Prevention Plan (SWPPP)

Describe the status of any SWPPP for permittee-owned or operated facilities including maintenance garages, public works yards, transfer stations, and other waste handling facilities where pollutants are exposed to stormwater:

The Town will identify properties and facilities in the MS4 that may require a site-specific SWPPP and prepare these in accordance with the General Permit requirements by the end of Permit Year 4.

Below, report on the number of site inspections for facilities that require a SWPPP completed during this reporting period.

Number of site inspections completed:

Describe any corrective actions taken at a facility with a SWPPP:

N/A

O&M Procedures for Stormwater Treatment Structures

Describe the status of the written procedure for stormwater treatment structure maintenance:

The Town will review existing procedures for stormwater treatment structures and establish written procedures in accordance with the General Permit requirements by the end of Permit Year 4.

Part V: Additional Information

Monitoring or Study Results

Results from any other stormwater or receiving water quality monitoring or studies conducted during the reporting period not otherwise mentioned above, where the data is being used to inform permit compliance or permit effectiveness must be attached.

- (●) Not applicable
- ( ) The results from additional reports or studies are attached to the email submission
- ( ) The results from additional reports or studies can be found at the following website(s):

If such monitoring or studies were conducted on your behalf or if monitoring or studies conducted by other entities were reported to you, a brief description of the type of information gathered or received shall be described below:

Additional Information

Optional: Enter any additional information relevant to your stormwater management program implementation during the reporting period. Include any BMP modifications made by the MS4 if not already discussed above:

COVID-19 Impacts

Optional: If any of the above year 2 requirements could not be completed due to the impacts of COVID-19, please identify the requirement that could not be completed, any actions taken to attempt to complete the requirement, and reason the requirement could not be completed below:

The Town-sponsored annual Earth Day Clean Up public involvement opportunity scheduled for April 25, 2020 was unable to be held during Permit Year 2 due to COVID-19 distancing guidelines. The Town will host another Clean Up event in Permit Year 3 if possible, and/or another web-based public involvement opportunity.

The employee training was intended to take place during Permit Year 2, but was delayed due to COVID-19. A training session was held on August 14, 2020 and included IDDE topics.

Activities Planned for Next Reporting Period

Please confirm that your SWMP has been, or will be, updated to comply with all applicable permit requirements including but not limited to the year 3 requirements summarized below. (Note: impaired waters and TMDL requirements are not listed below)

Yes, I agree ☒

- Complete IDDE ordinance
- Complete Construction/ Erosion and Sediment Control (ESC) ordinance
- Develop written procedures for site inspections and enforcement of sediment and erosion control measures
- Develop written procedures for site plan review

Annual Requirements

- Annual report submitted and available to the public
- Annual opportunity for public participation in review and implementation of SWMP
- Keep records relating to the permit available for 5 years and make available to the public
- Properly store and dispose of catch basin cleanings and street sweepings so they do not discharge to receiving waters
- Continue public education and outreach program

Provide any additional details on activities planned for permit year 3 below:

Based on available stormwater funding, the Town anticipates completing the following additional activities:
- Continue to improve Phase I mapping, including assigning receiving waters to outfalls and interconnections, completing initial catchment delineations, and identifying Town-owned BMPs.
- Adopting the proposed Catch Basin Cleaning, Inspection, and Disposal and Sweeping Streets and Town-Owned Parking Lots SOPs as Board of Selectmen policies.

Part VI: Certification of Small MS4 Annual Report 2020

40 CFR 144.32(d) Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: Keith R. Hickley

Title: Town Manager

Signature:

[Signatory may be a duly authorized representative]

Date: 9/2/20

Catch Basin Cleaning, Inspection, and Disposal SOP

The Catch Basin Cleaning, Inspection, and Disposal SOP was not finalized at the time of submission of the Permit Year 2 Annual Report. The adopted version of the SOP is included after the Permit Year 3 Annual Report.

Permit Year 3

(July 1, 2020 – June 30, 2021)

Year 3 Annual Report
Massachusetts Small MS4 General Permit
New Permittees
Reporting Period: July 1, 2020-June 30, 2021

Please DO NOT attach any documents to this form. Instead, attach all requested documents to an email when submitting the form

Unless otherwise noted, all fields are required to be filled out. If a field is left blank, it will be assumed the requirement or task has not been completed. Please ONLY report on activities between July 1, 2020 and June 30, 2021 unless otherwise requested.

Part I: Contact Information

Name of Municipality or Organization: Town of Winchendon

EPA NPDES Permit Number: MAR041244

Primary MS4 Program Manager Contact Information

Name: Brian Croteau Title: DPW Director

Street Address Line 1: Town of Winchendon

Street Address Line 2: 109 Front Street

City: Winchendon State: MA Zip Code: 01475

Email: bcroteau@townofwinchendon.com Phone Number: (978) 297-0170

Stormwater Management Program (SWMP) Information

SWMP Location (web address): https://www.townofwinchendon.com/public-works/pages/winchendon-stormwater-program

Date SWMP was Last Updated: October 2020

If the SWMP is not available on the web please provide the physical address:

Part II: Self-Assessment

First, in the box below, select the impairment(s) and/or TMDL(s) that are applicable to your MS4.

Impairment(s)

☐ Bacteria/Pathogens ☐ Chloride ☐ Nitrogen ☐ Phosphorus
☐ Solids/ Oil/ Grease (Hydrocarbons)/ Metals

TMDL(s)

In State: ☐ Assabet River Phosphorus ☐ Bacteria and Pathogen ☐ Cape Cod Nitrogen
☐ Charles River Watershed Phosphorus ☒ Lake and Pond Phosphorus

Out of State: ☐ Bacteria/Pathogens ☐ Metals ☒ Nitrogen ☐ Phosphorus

Clear Impairments and TMDLs

Next, check off all requirements below that have been completed. ***By checking each box you are certifying that you have completed that permit requirement fully.*** *If you have not completed a requirement leave the box unchecked. Additional information will be requested in later sections.*

Year 3 Requirements

☒ IDDE ordinance or other regulatory mechanism complete and adopted

☒ Construction/ Erosion and Sediment Control (ESC) ordinance or other regulatory mechanism complete and adopted

☒ Post-construction bylaw, ordinance, or other regulatory mechanism complete and adopted

☒ Developed written procedures for site inspections and enforcement of sediment and erosion control measures

☒ Developed written procedures for site plan review

☒ Kept a log of catch basins cleaned and inspected

Optional: If you would like to describe progress made on any incomplete requirements listed above, provide any additional information, and/or if any of the above year 3 requirements could not be completed due to the impacts of COVID-19, please identify the requirement that could not be completed, any actions taken to attempt to complete the requirement, and reason the requirement could not be completed below:

The Town adopted a new General Bylaw, Article 31: Stormwater Management Bylaw, at the May 17, 2021 Annual Town Meeting. The Bylaw contains IDDE, construction/ESC, and post-construction provisions and has been approved by the Attorney General's Office. Associated Stormwater Management Regulations, which include written procedures for site inspections, enforcement of sediment and erosion control measures, and site plan review, were developed in Permit Year 3 and will be adopted in Permit Year 4.

The Town developed an SOP for catch basin cleaning and inspection, which was adopted by the Board of Selectmen on November 9, 2020. The SOP was also included in the "Good Housekeeping and Pollution Prevention Program for Municipal Operations and Maintenance", which was drafted in Permit Year 3 and finalized on July 13, 2021. The Town conducts catch basin cleaning and is working to improve tracking. Currently, the Town's contractor tracks the number of basins cleaned by street and the volume removed. In

Permit Year 4, the Winchendon DPW will use their recently created ArcGIS Online mapping of the stormwater system to develop a new application to more efficiently track catch basin cleaning and inspection efforts.

Annual Requirements

☒ Provided an opportunity for public participation in review and implementation of SWMP and complied with State Public Notice Requirements

☒ Kept records relating to the permit available for 5 years and made available to the public

☒ Properly stored and disposed of catch basin cleanings and street sweepings so they did not discharge to receiving waters

☒ All curbed roadways were swept at least once within the reporting period

Optional: If you would like to describe progress made on any incomplete requirements listed above, provide any additional information, and/or if any of the above annual requirements could not be completed due to the impacts of COVID-19, please identify the requirement that could not be completed, any actions taken to attempt to complete the requirement, and reason the requirement could not be completed below:

Nitrogen (Combination of Impaired Waters Requirements and TMDL Requirements as Applicable)

Annual Requirements

*Public Education and Outreach**

☒ Distributed an annual message in the spring (April/May) that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release fertilizers

☒ Distributed an annual message in the summer (June/July) encouraging the proper management of pet waste, including noting any existing ordinances where appropriate

☐ Distributed an annual message in the fall (August/September/October) encouraging the proper disposal of leaf litter

** Public education messages can be combined with other public education requirements as applicable (see Appendix H and F for more information)*

Good Housekeeping and Pollution Prevention for Permittee Owned Operations

☐ Increased street sweeping frequency of all municipal owned streets and parking lots subject to Permit part 2.3.7.a.iii.(c) to a minimum of two times per year (spring and fall)

Potential structural BMPs

☒ Any structural BMPs listed in Table 3 of Attachment 1 to Appendix H already existing or installed in the regulated area by the permittee or its agents was tracked and the nitrogen removal by the BMP was estimated consistent with Attachment 1 to Appendix H. The BMP type, total area treated by the BMP, the design storage volume of the BMP and the estimated nitrogen removed in mass per year by the BMP were documented.

○ The BMP information is attached to the email submission

◉ The BMP information can be found at the following website:

N/A

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

Public Education and Outreach: As described in MCM 1, the Town's MS4 Public Education webpage provides educational information on proper fertilizer use, disposal of grass clippings, and proper lawn care maintenance. A brochure providing information about proper pet waste management was distributed during renewal of dog licenses. An additional message providing information on proper disposal of leaf litter will be distributed in Permit Year 4.

Sweeping: The Town did not sweep in the fall of Permit Year 3 since the written procedures for street sweeping (part of the operation and maintenance program) were not yet adopted. Additionally, DPW staff was reduced due to COVID-19. These procedures were adopted in November 2020 by the Select Board, and the Town will complete fall sweeping in Permit Year 4. Note that the street sweeping metric provided in MCM 6 includes streets located both in and outside of the urbanized area.

Potential Structural BMPs: No known municipal BMPs were installed in Winchendon's urbanized area/Long Island Sound watershed after the General Permit issuance; therefore, this requirement is not applicable. Additionally, mapping of structural BMPs and stormwater treatment structures is not due until Permit Year 5 for new permittees. Starting in Permit Year 6, the Town will track this information for any Town-owned structural BMPs and treatment structures installed within the watershed after these structures have been identified and mapped as part of Phase I mapping efforts.

Lake and Pond Phosphorus TMDL

☒ Began Phase 1 Lake Phosphorus Control Plan (LPCP)

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

Optional: Use the box below to provide any additional information you would like to share as part of your self-assessment:

Part III: Receiving Waters/Impaired Waters/TMDL

Have you made any changes to your lists of receiving waters, outfalls, or impairments since the NOI was submitted? Make sure you are referring to the most recent EPA approved Section 303(d) Impaired Waters List which can be found here: https://www.epa.gov/tmdl/region-1-impaired-waters-and-303d-lists-state

- (●) Yes
- ( ) No

If yes, describe below, including any relevant impairments or TMDLs:

The Town has made significant progress towards locating, mapping, and inventorying MS4 outfalls and interconnections. In Permit Year 3, the Town's consultant completed field work to GPS-locate additional stormwater structures and build upon work completed in Permit Year 1. Receiving waters were also identified for the mapped MS4 outfalls and interconnections.

Winchendon's NOI listed potential receiving waters based on the water quality limited waters within the Town's urbanized area that were included in the 2014 303(d) List. Part III of the Town's Permit Year 2 Annual Report identifies changes to the potential impairments based on the final 2016 303(d) List. Following is the updated list of receiving waters and number of outfalls discharging into each receiving water based on the Permit Year 1 and Permit Year 3 field work for the updated preliminary outfall/interconnection inventory:

Millers River (MA35-01): 6 outfalls
Tannery Pond/Millers River (MA35-01): 10 outfalls
Tributary to Tannery Pond/Millers River (MA35-01): 2 outfalls
North Branch Millers River (MA35-21): 1 outfall
Whitney Pond (MA35101): 2 outfalls
Wetland/Tributary to Whitney Pond (MA35101): 11 outfalls
Wetland/Tributary to Lake Denison (MA35017): 1 outfall
Isolated Wetland off Morse Ave: 1 outfall
Isolated Wetland off Murdock Ave: 2 outfalls
Isolated Wetland off of Hyde Park Street: 2 outfalls
Outside Receiving Water Area: 64 outfalls

19 additional outfalls are mapped in Winchendon's GIS that are either state owned, privately owned, or located outside of the MS4 urbanized area and are not regulated under the Small MS4 General Permit.

This removes Millers River (MA35-02 and MA35-20), Otter River (MA35-08), Whites Mill Pond (MA35099), Lake Denison (MA35017), Beamen Pond, and Beamen Brook as potential receiving waters from Winchendon's NOI. Winchendon is not subject to any impairments listed in Appendix H based on the 2016 303(d) List. There has been no changes to the TMDLs.

The Town will continue to refine the outfall/interconnection inventory in future permit years as the IDDE Program is implemented, including Phase I mapping improvements and outfall investigations.

Part IV: Minimum Control Measures

Part IV includes some of the metrics that will be required in upcoming annual reports. For this annual report, ***please report on MCM1 and MCM2 and any other metrics below that have an asterisk (*)****, along with any other metrics that you have started within this reporting period. Other than the metrics with an asterisk, the rest of the metrics are optional for new permittees. Then, proceed to Part V.*

*MCM1: Public Education

Number of educational messages completed **during this reporting period**: 3

Below, report on the educational messages completed ***during this reporting period****. For the measurable goal(s) please describe the method/measures used to assess the overall effectiveness of the educational program.*

BMP:Education and Outreach to Residents and Businesses (Multi-media Methods)

Message Description and Distribution Method:

The Town's Stormwater Program and MS4 Public Education webpages provide information on the Town's responsibilities under the MS4 permit. The MS4 Public Education webpage also includes educational information on proper fertilizer use, disposal of grass clippings, and proper lawn care maintenance and watering.

Targeted Audience: Residents and Businesses, institutions and commercial facilities

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

This messaging is available to all visitors of the Town's Stormwater Program and MS4 Public Education webpages.

Message Date(s): Ongoing

Message Completed for: Appendix F Requirements ☒ Appendix H Requirements ☐

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

BMP:Education and Outreach to Residents and Businesses (Multi-media Methods)

Message Description and Distribution Method:

A brochure titled "Be a Lawn Hero" from the Neoponset Stormwater Partnership is available from the Town's MS4 Public Education webpage. It explains how fertilizers can enter the stormwater system and impact the environment and water quality and provides tips for disposal of grass clippings and proper fertilizer use including recommending the use of slow-release fertilizers.

Another brochure available from the Town's MS4 Public Education webpage titled "Don't Trash the Grass" provides additional detail about environmentally conscious lawn care including tips on watering and mowing and information on disposal of grass clippings and proper fertilizer use.

A brochure titled "Use Lawn Chemicals Wisely" is available on the Town's MS4 Public Education webpage and explains why lawn chemicals can be dangerous to the environment and how pollutants in stormwater runoff can impact a watershed. It provides tips for fertilizing lawns including composting and gardening with native plants.

A flyer from Think Blue Massachusetts is also available on the Town's MS4 Public Education webpage and explains how improper fertilizer use can cause harm to water bodies.

Targeted Audience: Residents and Businesses, institutions and commercial facilities

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

This messaging is available to all visitors of the Town's DPW Stormwater Program and MS4 Public Education webpages.

Message Date(s): Ongoing

Message Completed for: Appendix F Requirements ☒ Appendix H Requirements ☐

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

BMP:Education and Outreach to Residents (Brochure with Dog Licenses)

Message Description and Distribution Method:

A brochure providing information about the proper management of pet waste was distributed during renewal of dog licenses.

Targeted Audience: Residents

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

1,532 dog licenses were issued in 2021, and the brochures were available to all residents obtaining or renewing licenses.

Message Date(s): Spring 2021

Message Completed for: Appendix F Requirements ☒ Appendix H Requirements ☐

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

Add an Educational Message

*MCM2: Public Participation

Describe the opportunity provided for public involvement in the development of the Stormwater Management Program (SWMP) **during this reporting period**:

The Stormwater Management Plan (SWMP) was made publicly available on the Town's website.

On October 26, 2020, the proposed "Catch Basin Cleaning, Inspection, and Disposal" and "Sweeping Streets and Town-Owned Parking Lots" Standard Operating Procedures (SOPs) were presented to the Board of Selectmen. On October 27, 2020 the Town provided notice via the Town News webpage that the policies could be publicly viewed; the notice also included copies of the draft SOPs and notice of the next Board of Selectmen meeting where they would be taking a vote to accept or deny the proposed changes. These SOPs were adopted at the Board of Selectmen meeting on November 9, 2020 as new policies for the Town.

The proposed Stormwater Management Bylaw was presented at the March 8, 2021 Board of Selectmen meeting as part of reviewing the "Amendments Recommended to Town Bylaws" agenda item. The new Bylaw replaced the previous Article 31, Low Impact Development (LID). The Stormwater Management Bylaw was also presented to voters at the Annual Town Meeting on May 17, 2021 where the Bylaw was approved.

Was this opportunity different than what was proposed in your NOI? Yes ○ No ◉

Describe any other public involvement or participation opportunities conducted **during this reporting period**:

The Town's Board of Health hosted a Town-wide cleanup event for Earth Day on May 15, 2021 where volunteers collected trash and debris throughout sections of Town. The Board of Health provided bags and gloves for volunteers and a 30 cubic yard dumpster for disposal of the trash collected.

Winchendon residents can properly dispose of household hazardous waste, including waste oil and antifreeze, at the transfer station throughout the year.

MCM3: Illicit Discharge Detection and Elimination (IDDE)

Sanitary Sewer Overflows (SSOs)

Check off the box below if the statement is true.

☐ This SSO section is NOT applicable because we DO NOT have sanitary sewer

*Below, report on the number of SSOs identified in the MS4 system and removed **during this reporting period**.*

Number of SSOs identified: 1

Number of SSOs removed: 1

Below, report on the total number of SSOs identified in the MS4 system and removed to date. At a minimum, report SSOs identified ***since the effective date of the permit (July 1, 2018)****.*

Total number of SSOs identified: 1

Total number of SSOs removed: 1

MS4 System Mapping

Below, check all that apply.

The following elements of the Phase I map have been completed:

- ☒ Outfalls and receiving waters
- ☐ Open channel conveyances
- ☒ Interconnections
- ☐ Municipally-owned stormwater treatment structures
- ☒ Waterbodies identified by name and indication of all use impairments
- ☒ Initial catchment delineations

Describe any additional progress you made on your map during this reporting period or provide additional status information regarding your map:

The Town has made significant progress on mapping the Phase I, Phase II, and some recommended mapping elements. In Permit Year 3, Winchendon worked with a consultant to complete field work to map additional stormwater infrastructure and continue to improve the outfall and interconnection inventory. The Town has mapped known outfalls and interconnections in GIS and identified receiving waters, as described in Part III of this report. Initial catchment delineations were also developed in Permit Year 3 and some municipal stormwater BMPs were added to the mapping. As Phase I mapping efforts are continued, the Town will identify additional unmapped municipal stormwater BMPs and open channel conveyances to add them to the GIS.

Screening of Outfalls/Interconnections

If conducted, please submit any outfall monitoring results from this reporting period. Outfall monitoring results should include the date, outfall/interconnection identifier, location, weather conditions at time of sampling, precipitation in previous 48 hours, field screening parameter results, and results from all analyses. Please also include the updated inventory and ranking of outfalls/interconnections based on monitoring results.

- ◉ No outfalls were inspected
- ◉ The outfall screening data is attached to the email submission
- ○ The outfall screening data can be found at the following website:

Below, report on the number of outfalls/interconnections screened ***during this reporting period****.*

Number of outfalls screened: 25

Below, report on the percent of outfalls/interconnections screened ***to date****.*

Percent of outfalls screened: 51

Optional: Provide additional information regarding your outfall/interconnection screening:

In Permit Year 1 and Permit Year 3, the Town and their stormwater consultant collected outfall inventory data as part of Phase I mapping efforts. 52 outfalls (27 in Permit Year 1 and 25 in Permit Year 3) were inventoried and screened during dry weather conditions. The outfall inventory and screening data is attached. There is no water quality data to report at this time; outfalls that had flow will be revisited and screened in accordance with the General Permit schedule. No visual or olfactory evidence of an illicit discharge was found at any inspected outfall.

Catchment Investigations

*If conducted, please submit all data collected **during this reporting period** as part of the dry and wet weather investigations. Also include the presence or absence of System Vulnerability Factors for each catchment.*

- (●) No catchment investigations were conducted
- ( ) The catchment investigation data is attached to the email submission
- ( ) The catchment investigation data can be found at the following website:

*Below, report on the number of catchment investigations completed **during this reporting period**.*

Number of catchment investigations completed this reporting period: 0

*Below, report on the percent of catchments investigated **to date**.*

Percent of total catchments investigated: 0

Optional: Provide any additional information for clarity regarding the catchment investigations below:

IDDE Progress

If illicit discharges were found, please submit a document describing work conducted over this reporting period, and cumulative to date, including location source; description of the discharge; method of discovery; date of discovery; and date of elimination, mitigation, or enforcement OR planned corrective measures and schedule of removal.

- (●) No illicit discharges were found
- ( ) The illicit discharge removal report is attached to the email submission
- ( ) The illicit discharge removal report can be found at the following website:

*Below, report on the number of illicit discharges identified and removed, along with the volume of sewage removed **during this reporting period**.*

Number of illicit discharges identified: 0

Number of illicit discharges removed: 0

Estimated volume of sewage removed: 0 gallons/day

Below, report on the total number of illicit discharges identified and removed to date. At a minimum, report on the number of illicit discharges identified and removed ***since the effective date of the permit (July 1, 2018)****.*

Total number of illicit discharges identified: 0

Total number of illicit discharges removed: 0

Optional: Provide any additional information for clarity regarding illicit discharges identified, removed, or planned to be removed below:

Employee Training

Describe the frequency and type of employee training if conducted **during this reporting period**:

A training for DPW employees was held on August 14, 2020, which reviewed the overall MS4 program, illicit discharges to the drain, IDDE Program responsibilities, and reporting, as well as municipal good housekeeping topics.

MCM4: Construction Site Stormwater Runoff Control

Below, report on the construction site plan reviews, inspections, and enforcement actions completed ***during this reporting period****.*

Number of site plan reviews completed:

Number of inspections completed:

Number of enforcement actions taken:

Optional: Enter any additional information relevant to construction site plan reviews, inspections, and enforcement actions:

The new Stormwater Management Bylaw adopted on May 17, 2021 and associated Stormwater Management Regulations that will be adopted in Permit Year 4 establish the procedures for site plan review, inspections, and enforcement. The Planning Board will begin to track these metrics under the Stormwater Management Bylaw for future annual reports.

MCM5: Post-Construction Stormwater Management in New Development and Redevelopment

As-built Drawings

Describe the status of the measures the MS4 has utilized to require the submission of as-built drawings and ensure long term operation and maintenance of completed construction sites:

The new Stormwater Management Bylaw adopted at the Annual Town Meeting on May 17, 2021 requires the submission of as-built drawings in Section 31.19 as part of the Final Reports. Any Land Disturbance Permit obtained under the Bylaw must include measures to ensure adequate long-term operation and maintenance of stormwater management design features and BMPs and the Stormwater Authority may choose to impose requirements to ensure compliance.

Street Design and Parking Lots Report

Describe the status of the street design and parking lots assessment including any planned or completed changes to local regulations and guidelines:

Preparation for the Street Design and Parking Lots Report has not yet begun as this requirement is due in Permit Year 6.

Green Infrastructure Report

Describe the status of the green infrastructure report including the findings and progress towards making the practice allowable:

Preparation for the Green Infrastructure Report has not yet begun as this requirement is due in Permit Year 6.

Retrofit Properties Inventory

Describe the status of the inventory of permittee-owned properties that could be modified or retrofitted with BMPs to mitigate impervious areas and report on any properties that have been modified or retrofitted:

Preparation for the Retrofit Properties Inventory has not yet begun as this requirement is due in Permit Year 6.

MCM6: Good Housekeeping

***Catch Basin Cleaning**

Describe the status of the catch basin cleaning optimization plan:

Included in the August 2020 catch basin cleaning SOP, which was adopted by the Selectmen on 11/9/2020.

If complete, attach the catch basin cleaning optimization plan or the schedule to gather information to develop the optimization plan:

- (selected) The catch basin cleaning optimization plan or schedule is attached to the email submission
- ( ) The catch basin cleaning optimization plan or schedule can be found at the following website:

*Below, report on the number of catch basins inspected and cleaned, along with the total volume of material removed from the catch basins **during this reporting period**.*

Number of catch basins inspected: 523

Number of catch basins cleaned: 523

Total volume or mass of material removed from all catch basins: 100 cubic yards

Below, report on the total number of catch basins in the MS4 system, if known.

Total number of catch basins: 686

If applicable:

Report on the actions taken if a catch basin sump is more than 50% full during two consecutive routine inspections/cleaning events:

The volume of material removed is estimated, and the Town is working to improve tracking. The number of catch basins cleaned and inspected during Permit Year 3 includes catch basins located both in and outside of the urbanized area. Not all catch basins located within the MS4 were cleaned during Permit Year 3, but catch basins are rarely 50% full. In Permit Year 4, the Winchendon DPW will use their recently created ArcGIS Online mapping of the stormwater system to develop a new mobile application to more efficiently track catch basin cleaning and inspection efforts.

<u>*Street Sweeping</u>

Describe the status of the written procedures for sweeping streets and municipal-owned lots:

The Town developed an SOP for sweeping streets and Town-owned parking lots, which was adopted by the Board of Selectmen on November 9, 2020. The SOP was also included in the "Good Housekeeping and Pollution Prevention Program for Municipal Operations and Maintenance", which was drafted in Permit Year 3 and finalized on July 13, 2021.

*Report on street sweeping completed **during this reporting period** using one of the three metrics below.*

- (selected) Number of miles cleaned: 140
- ( ) Volume of material removed: [Select Units]
- ( ) Weight of material removed: [Select Units]

If applicable:

For rural uncurbed roadways with no catch basins, describe the progress of the inspection, documentation, and targeted sweeping plan:

N/A

O&M Procedures and Inventory of Permittee-Owned Properties

Below, check all that apply.

The following permittee-owned properties have been inventoried:

- ☒ Parks and open spaces
- ☒ Buildings and facilities
- ☒ Vehicles and equipment

The following O&M procedures for permittee-owned properties have been completed:

- ☒ Parks and open spaces
- ☒ Buildings and facilities
- ☒ Vehicles and equipment

Winter Road Maintenance

Describe the status of the written procedures for winter road maintenance including the storage of salt and sand:

Written procedures for winter road maintenance were developed as part of the "Good Housekeeping and Pollution Prevention Program for Municipal Operations and Maintenance", which was drafted in Permit Year 3 and finalized on July 13, 2021.

Stormwater Pollution Prevention Plan (SWPPP)

Describe the status of any SWPPP for permittee-owned or operated facilities including maintenance garages, public works yards, transfer stations, and other waste handling facilities where pollutants are exposed to stormwater:

The Town identified that the Highway Garage property is located outside of the urbanized area, and therefore, a SWPPP is not required for this facility.

*Below, report on the number of site inspections for facilities that require a SWPPP completed **during this reporting period**.*

Number of site inspections completed:

Describe any corrective actions taken at a facility with a SWPPP:

N/A

O&M Procedures for Stormwater Treatment Structures

Describe the status of the written procedure for stormwater treatment structure maintenance:

Written procedures for operation and maintenance of stormwater treatment structures were developed as part of the "Good Housekeeping and Pollution Prevention Program for Municipal Operations and Maintenance", which was drafted in Permit Year 3 and finalized on July 13, 2021.

Part V: Additional Information

***Monitoring or Study Results**

Results from any other stormwater or receiving water quality monitoring or studies conducted during the reporting period not otherwise mentioned above, where the data is being used to inform permit compliance or permit effectiveness must be attached.

- (●) Not applicable
- ( ) The results from additional reports or studies are attached to the email submission
- ( ) The results from additional reports or studies can be found at the following website(s):

If such monitoring or studies were conducted on your behalf or if monitoring or studies conducted by other entities were reported to you, a brief description of the type of information gathered or received shall be described below:

Additional Information

Optional: Enter any additional information relevant to your stormwater management program implementation during the reporting period. Include any BMP modifications made by the MS4 if not already discussed above:

COVID-19 Impacts

Optional: If any of the above year 3 requirements could not be completed due to the impacts of COVID-19, please identify the requirement that could not be completed, any actions taken to attempt to complete the requirement, and reason the requirement could not be completed below:

***Activities Planned for Next Reporting Period**

Please confirm that your SWMP has been, or will be, updated to comply with all applicable permit requirements including but not limited to the year 4 requirements summarized below. (Note: impaired waters and TMDL requirements are not listed below)

Yes, I agree ☒

- Identify and develop inventory of all known locations where SSOs have discharged to the MS4 in the last 5 years
- Identify each outfall and interconnection discharging from MS4, classify into the relevant category, and priority rank each catchment for investigation
- Develop written IDDE plan including a procedure for screening and sampling outfalls
- Develop written procedures to require the submission of as-built drawings and ensure the long term operation and maintenance of completed construction sites and add these procedures to the SWMP
- Develop written operations and maintenance procedures for parks and open space, buildings and facilities, and vehicles and equipment and added these procedures to the SWMP
- Develop an inventory of all permittee owned facilities in the categories of parks and open space, buildings and facilities, and vehicles and equipment and added this inventory to the SWMP
- Complete a written program for MS4 infrastructure maintenance to reduce the discharge of pollutants
- Develop written SWPPPs, included in the SWMP, for all of the following permittee owned or operated facilities: maintenance garages, public works yards, transfer stations, and other waste handling facilities where pollutants are exposed to stormwater
- Enclose or cover storage piles of salt or piles containing salt used for deicing or other purposes

<u>Annual Requirements</u>

- Annual report submitted and available to the public
- Annual opportunity for public participation in review and implementation of SWMP
- Keep records relating to the permit available for 5 years and make available to the public
- Properly store and dispose of catch basin cleanings and street sweepings so they do not discharge to receiving waters
- Continue public education and outreach program
- Sweep all curbed roadways at least once within the reporting period
- Provide training within the reporting period to employees involved in IDDE program
- Clean catch basins in accordance with catch basin cleaning procedures to ensure that no catch basin is greater than 50% full

Provide any additional details on activities planned for permit year 4 below:

The Town acknowledges the General Permit Year 4 requirements and will complete as many activities as possible based on funding and staff availability.

*Part VI: Certification of Small MS4 Annual Report 2021

40 CFR 144.32(d) Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: Justin Sultzbach

Title: Town Manager

Signature:

[Signatory may be a duly authorized representative]

Date: 9.28.21

Outfall Inventory and Dry Weather Screening Data

The outfall inventory and dry weather screening data are available in the Town's record keeping files at the Winchendon Department of Public Works

STANDARD OPERATING PROCEDURE

Catch Basin Cleaning, Inspection, and Disposal

TARGETED POLLUTANTS

Sediment
Nutrients
Trash
Metals
Oil and Grease
Organics
Low Dissolved Oxygen
Bacteria

Catch basins help minimize flooding and protect water quality by removing trash, sediment, decaying debris, and other solids from stormwater runoff. Catch basin cleaning reduces foul odors, prevents clogs in the storm drain system, and reduces the loading of suspended solids, nutrients, and bacteria to receiving waters.

Suggested Standard Operating Procedures

Implement applicable suggested SOPs to reduce the influx of pollutants to the stormwater drainage system to the maximum extent practicable.

- Target cleaning for early spring.
- Clean manually or with equipment (i.e., clamshell or vactor truck).
- Properly dewater and dispose of catch basin material or store until contractor picks up cleanings (see “Management of Catch Basin Cleanings”).
- Repair damaged catch basins including frames and grates.
- Install hoods if catch basins do not have them.
- Inform employees that catch basins are part of the stormwater drainage system and not the sanitary sewer system.
- The DPW should maintain an inventory of cleaning activities. Information should at a minimum include amount of cleanings removed and areas with heavily filled basins.
- Facilities should maintain a log of cleaning activities on their parking lots. Information should include date of cleaning activities, staff/ contractor that performs activities, number of basins cleaned, illicit connection/odor issues, repair issues, or heavily filled catch basins.
- Report any illicit (illegal) discharges to the DPW. Report oil spills immediately to the Fire Department and DPW.

Optimization of Inspection & Cleaning

Section 2.3.7.a.iii.2 of the 2016 Small MS4 General Permit requires that Winchendon optimize routine inspections, cleaning, and maintenance of catch basins within the MS4 to meet the following criteria:

- Prioritize inspection and maintenance for catch basins located near construction activities and clean catch basins more frequently if excessive sediment or debris loadings is found.
- Establish a catch basin cleaning schedule that ensures no catch basin is ever more than 50 percent full.

The Town hires a contractor to clean the catch basins and dispose of the material at the Templeton Wastewater Treatment Plant, where it is used as sludge cover. If this disposal practice changes in the future, the cleanings must be disposed of as solid waste according to MassDEP guidelines, which are included at the end of this SOP.

The Town will work to optimize routine inspections, cleaning, and maintenance of catch basins within the MS4 as follows:

- Winchendon, via its contractor, will clean all catch basins located within the MS4 urbanized area a minimum of one time per year.
- The Town and/or its contractor will continue to track the number of catch basins cleaned per street and the approximate volume of material removed (see an example tracking spreadsheet from Permit Year 1 below).

MS4 - BASIN CLEANING - JULY 1, 2018 - JUNE 30,2019					
DATE	STREET	YARDS	# DONE	DRIVER	COMPANY
8-9-18	EAGLE RD	1.5	8	SAL	Sams
	Front st	8	22		
	School st	3	16		
8-14-18	River st.	4	17	SAL	Sams
	Hill st	1	2		
	BENJAMIN	2	4		

- The Town will provide its contractor with educational materials about illicit discharges and the Town's reporting protocols so any instances of illicit discharges or connections observed in the field can be reported and tracked. A laminated version of the enclosed *Pocket Guide to Illicit Discharges* should be given to and reviewed with contractors and/or Town field staff prior to completing catch basin cleaning work.

Reporting

- Report any repair or maintenance problems to the DPW. Repair problems may include frame and grate replacement.
- Keep a log of catch basins cleaned or inspected.
- Report in each annual report the total number of catch basins, number inspected, number cleaned, and the total volume or mass of material removed from all catch basins.

MassDEP **Management of Catch Basin Cleanings** (Source: https://www.mass.gov/lists/massdep-solid-waste-policies-guidance-fact-sheets#managing-specific-solid-wastes-)

Catch basin cleanings - solid materials such as leaves, sand and twigs removed from stormwater collection systems during cleaning operations - are typically classified as a solid waste by the Department of Environmental Protection (MassDEP). Catch basin cleanings must be handled and disposed in accordance with the agency's applicable regulations, policies and guidance.

Handling and Disposal

Except as explained below, catch basin cleanings from stormwater-only drainage systems may be disposed at any landfill that is permitted by MassDEP to accept solid waste. MassDEP does not routinely require stormwater only catch basin cleanings to be tested before disposal, unless there is evidence that they have been contaminated by a spill or some other means. Contaminated catch basin cleanings must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.000, and handled as hazardous waste if appropriate. Systems that collect stormwater run-off into sanitary sewers are called "combined sewers." MassDEP may require cleanings from combined sewer catch basins to be tested before disposal.

Landfill Restrictions

The MassDEP 310 CMR 19.000: Solid Waste Management Facility Regulations (specifically see Section 19.130(7)) prohibit Massachusetts landfills from accepting materials that contain free draining liquids. When there is no free water in a truck used to transport catch basin cleanings, the agency will generally be satisfied that the material is sufficiently dry. Otherwise, the material will need to undergo a Paint Filter Liquids Test. One way to remove liquids is to use a hydraulic lift truck during catch basin cleaning operations so that the material can be decanted at the site. After material from several catch basins along the same system is loaded, the truck may be elevated so that any free draining liquid is allowed to flow back into the drainage structure. MassDEP may approve catch basin cleanings for use as grading and shaping material at landfills undergoing closure (see the agency's Revised Guidelines for Determining Closure Activities at Inactive Unlined Landfill Sites for additional information). Catch basin cleanings may be used as daily cover or grading material at active landfills only with specific MassDEP approval of the proposed use. Consult with the Solid Waste Section Chief in the appropriate MassDEP Regional Office for information about applying for an approval and/or a Beneficial Use Determination (see Section 19.060 of the 310 CMR 19.000: Solid Waste Management Facility Regulations) for other uses, including non-landfill uses.

Implementation Schedule

- In accordance with General Permit requirements for new permittees, this SOP must be adopted and implemented by the end of Permit Year 4 (June 30, 2022).
- The Town must always properly store and dispose of catch basin cleanings such that they do not discharge to receiving waters.

Attachments

1. *Pocket Guide to Illicit Discharges*

Pocket Guide to

Illicit Discharges

When cleaning a catch basin or doing infrastructure maintenance, if you <u>see</u> or <u>smell</u> any of the following, please call:

Name: Al Gallant

Title: Public Works Director

Phone: 978-297-5411

For Imminent Emergency Situations where there is an immediate risk to public health and safety: Call 911

Tighe&Bond

www.tighebond.com

Pocket Guide to

Illicit Discharges

When cleaning a catch basin or doing infrastructure maintenance, if you see or smell any of the following, please call:

Name: Al Gallant

Title: Public Works Director

Phone: 978-297-5411

For Imminent Emergency Situations where there is an immediate risk to public health and safety: Call 911

Tighe&Bond

www.tighebond.com

Lake Phosphorus Control Plan (LPCP) for Winchendon’s Lakes and Ponds in Millers River Basin Legal Analysis

The LPCP Legal Analysis is located in Appendix I of this SWMP

Permit Year 4

(July 1, 2021 – June 30, 2022)

Year 4 Annual Report
Massachusetts Small MS4 General Permit
New Permittees
Reporting Period: July 1, 2021-June 30, 2022

Please DO NOT attach any documents to this form. Instead, attach all requested documents to an email when submitting the form

Unless otherwise noted, all fields are required to be filled out. If a field is left blank, it will be assumed the requirement or task has not been completed. Please ONLY report on activities between July 1, 2021 and June 30, 2022 unless otherwise requested.

Part I: Contact Information

Name of Municipality or Organization: Town of Winchendon

EPA NPDES Permit Number: MAR041244

Primary MS4 Program Manager Contact Information

Name: Brian Croteau

Title: DPW Director

Street Address Line 1: Town of Winchendon

Street Address Line 2: 109 Front Street

City: Winchendon

State: MA

Zip Code: 01475

Email: bcroteau@townofwinchendon.com

Phone Number: (978) 297-0170

Stormwater Management Program (SWMP) Information

SWMP Location (web address): https://www.townofwinchendon.com/public-works/pages/winchendon-stormwater-program

Date SWMP was Last Updated: December 2021

If the SWMP is not available on the web please provide the physical address:

Part II: Self-Assessment

First, in the box below, select the impairment(s) and/or TMDL(s) that are applicable to your MS4.

Impairment(s)

☐ Bacteria/Pathogens ☐ Chloride ☐ Nitrogen ☐ Phosphorus
☐ Solids/ Oil/ Grease (Hydrocarbons)/ Metals

TMDL(s)

In State: ☐ Assabet River Phosphorus ☐ Bacteria and Pathogen ☐ Cape Cod Nitrogen
☐ Charles River Watershed Phosphorus ☒ Lake and Pond Phosphorus

Out of State: ☐ Bacteria/Pathogens ☐ Metals ☒ Nitrogen ☐ Phosphorus

Clear Impairments and TMDLs

Next, check off all requirements below that have been completed. ***By checking each box you are certifying that you have completed that permit requirement fully.*** *If you have not completed a requirement leave the box unchecked. Additional information will be requested in later sections.*

Year 4 Requirements

☒ Identified and developed an inventory of all known locations where SSOs have discharged to the MS4 in the last 5 years
- ◉ The SSO inventory is attached to the email submission
- ○ The SSO inventory can be found at the following website:

☒ Identified each outfall and interconnection discharging from MS4, classified into the relevant category, and priority ranked each catchment for investigation
- ◉ The priority ranking of outfalls/interconnections is attached to the email submission
- ○ The priority ranking of outfalls/interconnections can be found at the following website:

☒ Developed written IDDE plan including a procedure for screening and sampling outfalls

☒ Developed written procedures to require the submission of as-built drawings and ensure the long term operation and maintenance of completed construction sites and added these procedures to the SWMP

☒ Developed written operations and maintenance procedures for parks and open space, buildings and facilities, and vehicles and equipment and added these procedures to the SWMP

☒ Developed an inventory of all permittee owned facilities in the categories of parks and open space, buildings and facilities, and vehicles and equipment and added this inventory to the SWMP

☒ Completed a written program for MS4 infrastructure maintenance to reduce the discharge of pollutants

☒ Developed written SWPPPs, included in the SWMP, for all of the following permittee owned or operated facilities: maintenance garages, public works yards, transfer stations, and other waste handling facilities where pollutants are exposed to stormwater

☒ Enclosed or covered storage piles of salt or piles containing salt used for deicing or other purposes

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

The Town of Winchendon Highway Garage Facility and other waste handling facilities are located outside of the urbanized area, and therefore do not require a site-specific SWPPP. This determination was submitted to EPA and MassDEP in the Year 3 annual report on September 28, 2021.

Annual Requirements

- ☒ Provided an opportunity for public participation in review and implementation of SWMP and complied with State Public Notice Requirements
- ☒ Kept records relating to the permit available for 5 years and made available to the public
- ☐ Provided training to employees involved in IDDE program within the reporting period
- ☒ Properly stored and disposed of catch basin cleanings and street sweepings so they did not discharge to receiving waters
- ☒ All curbed roadways were swept at least once within the reporting period

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

IDDE specific training was not provided for DPW employees during Permit Year 4. However, the DPW director reviews drainage infrastructure maintenance best practices with field staff on a regular basis.

Nitrogen (Combination of Impaired Waters Requirements and TMDL Requirements as Applicable)

Annual Requirements

*Public Education and Outreach**

- ☒ Distributed an annual message in the spring (April/May) that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release fertilizers
- ☒ Distributed an annual message in the summer (June/July) encouraging the proper management of pet waste, including noting any existing ordinances where appropriate
- ☒ Distributed an annual message in the fall (August/September/October) encouraging the proper disposal of leaf litter

** Public education messages can be combined with other public education requirements as applicable (see Appendix H and F for more information)*

Good Housekeeping and Pollution Prevention for Permittee Owned Operations

- ☒ Increased street sweeping frequency of all municipal owned streets and parking lots subject to Permit part 2.3.7.a.iii.(c) to a minimum of two times per year (spring and fall)

Potential structural BMPs

- ☒ Any structural BMPs listed in Table 3 of Attachment 1 to Appendix H already existing or installed in the regulated area by the permittee or its agents was tracked and the nitrogen removal by the BMP was estimated consistent with Attachment 1 to Appendix H. The BMP type, total area treated by the BMP, the design storage volume of the BMP and the estimated nitrogen removed in mass per year by the BMP were documented.

    - ○ The BMP information is attached to the email submission
    - ○ The BMP information can be found at the following website:

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

Potential Structural BMPs: In recent permit years, the Town has installed proprietary BMPs (i.e., Stormceptors) as part of roadway or site reconstruction projects. Based on the permit appendix and EPA guidance, these BMP types do not currently count for nitrogen removal credits. Three stormwater basins have been installed in Town recently. Two are located outside of the urbanized area and do not require nitrogen removal calculations. The third was installed by DPW staff, however design plans and stormwater reports were not developed as part of the installation and therefore the nitrogen removal cannot be determined. Additionally, mapping of structural BMPs and stormwater treatment structures is not due until Permit Year 5 for new permittees. Starting in Permit Year 6, the Town will track this information for any Town-owned structural BMPs and treatment structures installed within the watershed after these structures have been identified and mapped as part of Phase I mapping efforts.

Lake and Pond Phosphorus TMDL

☒ Completed Legal Analysis

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

Optional: Use the box below to provide any additional information you would like to share as part of your self-assessment:

Part III: Receiving Waters/Impaired Waters/TMDL

Have you made any changes to your lists of receiving waters, outfalls, or impairments since the NOI was submitted? Make sure you are referring to the most recent EPA approved Section 303(d) Impaired Waters List which can be found here: https://www.epa.gov/tmdl/region-1-impaired-waters-and-303d-lists-state

- (●) Yes
- ( ) No

If yes, describe below, including any relevant impairments or TMDLs:

Winchendon's NOI listed potential receiving waters based on the water quality limited waters within the Town's urbanized area that were included in the 2014 303(d) List. Part III of the Town's Permit Year 2 Annual Report included a summary of potential impairments and receiving waters based on the 2016 303(d) List. Part III of the Town's Permit Year 3 Annual Report included a summary of field work completed to refine the outfall inventory, receiving waters, and applicable impairments.

The final 2018/2020 303(d) List adds Ambient Bioassays - Chronic Aquatic Toxicity as an impairment to Millers River (MA35-01). There are no other changes to the Town's receiving waters and associated impairments based on the final 2018/2020 303(d) List. Winchendon is not subject to any impairments listed in Appendix H and there have been no changes to the TMDLs.

Winchendon updates the drainage system mapping as needed as field work is completed and discrepancies are found.

Part IV: Minimum Control Measures

Part IV includes some of the metrics that will be required in upcoming annual reports. For this annual report, ***please report on MCM1 and MCM2 and any other metrics below that have an asterisk (*)****, along with any other metrics that you have started within this reporting period. Other than the metrics with an asterisk, the rest of the metrics are optional for new permittees. Then, proceed to Part V.*

*MCM1: Public Education

Number of educational messages completed **during this reporting period**: 4

Below, report on the educational messages completed ***during this reporting period****. For the measurable goal(s) please describe the method/measures used to assess the overall effectiveness of the educational program.*

BMP:Education and Outreach to Residents and Businesses (Multi-media Methods)

Message Description and Distribution Method:

The Town provides MS4 permit information to the public on their Stormwater Program webpage, including an overview of the NPDES Stormwater Program minimum control measure components and a link to the Town's SWMP.

Targeted Audience: Residents and Businesses, institutions and commercial facilities

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

This messaging is available to all visitors of the Town's Stormwater Program webpage.

Message Date(s): Ongoing

Message Completed for: Appendix F Requirements ☒ Appendix H Requirements ☐

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

BMP:Education and Outreach to Residents and Businesses (Multi-media Methods

Message Description and Distribution Method:

The Town's MS4 Public Education webpage includes four educational flyers and brochures for the public to access.

One is titled "Be a Lawn Hero" originally created by the Neoponset Stormwater Partnership. The brochure addresses the problems with excess fertilizer in lawns. It also explains proper grass clipping disposal to prevent the clippings from entering storm drains and wetlands.

Another brochure titled "Don't Trash the Grass" gives tips on lawn care. It addresses proper fertilizer usage, mowing, using grass clippings as natural fertilizer, and water practices

"Use Lawn Chemicals Wisely" is an additional brochure on the MS4 Public Education webpage. It provides facts about lawn chemicals and the problems of fertilizer. It gives options for actions that can be taken to lessen the effect lawn chemicals have on water quality. The brochure includes information how stormwater runoff can affect a Town's watershed.

A Think Blue Massachusetts flyer on the webpage includes information on the effect of fertilizer on waterways. It explains that excess fertilizer can harm the natural vegetation and animals.

Targeted Audience: Residents and Businesses, institutions and commercial facilities

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

This messaging is available to all visitors of the Town's DPW Stormwater Program and MS4 Public Education webpages.

Message Date(s): Ongoing

Message Completed for: Appendix F Requirements ☒ Appendix H Requirements ☐

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

BMP:Education and Outreach to Residents (Brochure with Dog Licenses)

Message Description and Distribution Method:

A brochure is provided to residents when dog licenses are issued or renewed. The brochure explains the proper management of pet waste.

Targeted Audience: Residents

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

1,664 dog licenses were issued in Permit Year 4.

Message Date(s): January - March 2022

Message Completed for: Appendix F Requirements ☒ Appendix H Requirements ☐

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

BMP:Education and Outreach to Residents (Multi-media Methods)

Message Description and Distribution Method:

A message to residents titled "5 Ways to Use Fallen Leaves" was posted on the Town's Facebook encouraging the proper disposal of leaf litter.

Targeted Audience: Residents

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

The information is available to all visitors on the Town's Facebook page, including approximately 3,240 Facebook followers. The Facebook post had 9 likes and 6 shares.

Message Date(s): October 27, 2021

Message Completed for: Appendix F Requirements ☒ Appendix H Requirements ☐

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

Add an Educational Message

*MCM2: Public Participation

Describe the opportunity provided for public involvement in the development of the Stormwater Management Program (SWMP) **during this reporting period**:

The Stormwater Management Plan (SWMP) is available on the Town's website for the public to review and comment.

The Stormwater Management Bylaw was presented for adoption at the Annual Town Meeting on May 17, 2021. The Stormwater Management Regulations were presented for public comment at a Planning Board public meeting on October 19, 2021. At this meeting, an overview of the stormwater program, a description of the new bylaw and regulations, and an informational handout about bylaw applicability were provided. The Regulations were then presented and adopted at a public hearing on November 16, 2021. Meetings and hearings were properly advertised in accordance with Massachusetts public meeting law. All of the meetings' minutes are publicly available to view on the Town's website.

Was this opportunity different than what was proposed in your NOI? Yes ○ No ◉

Describe any other public involvement or participation opportunities conducted **during this reporting period**:

Household hazardous waste, including waste oil and antifreeze, can be disposed of at the transfer station throughout the year by residents. Additionally, street cleanups and general waste from residents can be disposed of at the transfer station.

On May 7, 2022 the Town's Board of Health hosted a Town cleanup event for Earth Day. At the cleanup approximately 45 volunteers collected trash and litter throughout the Town for proper disposal. The volunteers filled a 40-yard dumpster with debris collected. The Board of Health provided the dumpster for trash disposal. The Board also provided volunteers with gloves and trash bags.

MCM3: Illicit Discharge Detection and Elimination (IDDE)

***Sanitary Sewer Overflows (SSOs)**

Check off the box below if the statement is true.

☐ This SSO section is NOT applicable because we DO NOT have sanitary sewer

Below, report on the number of SSOs identified in the MS4 system and removed ***during this reporting period****.*

Number of SSOs identified: 0

Number of SSOs removed: 0

Below, report on the total number of SSOs identified in the MS4 system and removed to date. At a minimum, report SSOs identified ***since the effective date of the permit (July 1, 2018)****.*

Total number of SSOs identified: 1

Total number of SSOs removed: 1

MS4 System Mapping

Below, check all that apply.

The following elements of the Phase I map have been completed:

☒ Outfalls and receiving waters

☐ Open channel conveyances

☒ Interconnections

☐ Municipally-owned stormwater treatment structures

☒ Waterbodies identified by name and indication of all use impairments

☒ Initial catchment delineations

Describe any additional progress you made on your map during this reporting period or provide additional status information regarding your map:

The Town made significant progress on MS4 system mapping in Permit Year 3. In Permit Year 4, additional municipally-owned stormwater treatment structures were added to the Town's stormwater map and updates were made as errors were found during field work. As Phase I mapping efforts are continued in accordance with the schedule for new permittees, the Town will identify additional unmapped municipal stormwater BMPs and open channel conveyances to add them to the GIS.

Screening of Outfalls/Interconnections

If conducted, please submit any outfall monitoring results from this reporting period. Outfall monitoring results should include the date, outfall/interconnection identifier, location, weather conditions at time of sampling, precipitation in previous 48 hours, field screening parameter results, and results from all analyses. Please also include the updated inventory and ranking of outfalls/interconnections based on monitoring results.

- (•) No outfalls were inspected
- (•) The outfall screening data is attached to the email submission
- ( ) The outfall screening data can be found at the following website:

Below, report on the number of outfalls/interconnections screened ***during this reporting period****.*

Number of outfalls screened: 0

Below, report on the percent of outfalls/interconnections screened ***to date****.*

Percent of outfalls screened: 51

Optional: Provide additional information regarding your outfall/interconnection screening:

In Permit Year 1 and Permit Year 3, the Town and their stormwater consultant collected outfall inventory data as part of Phase I mapping efforts. 52 outfalls were inventoried and screened during dry weather conditions and the outfall inventory and screening data was attached to the Permit Year 3 Annual Report. No outfall investigations were completed in Permit Year 4; the selection for attaching data to the submission is N/A. The Town has completed a significant effort to map and screen outfalls ahead of schedule, and 51% of the Town's known MS4 outfalls have been screened to date. The Town will complete the remaining screening effort in accordance with the Permit schedule for new permittees (by the end of Permit Year 6; July 1, 2024). The Town is pursuing a MassDEP Stormwater Asset Management Grant for Permit Year 6, which would provide funding assistance for this effort.

Catchment Investigations

If conducted, please submit all data collected ***during this reporting period*** *as part of the dry and wet weather investigations. Also include the presence or absence of System Vulnerability Factors for each catchment.*

- (•) No catchment investigations were conducted
- ( ) The catchment investigation data is attached to the email submission
- ( ) The catchment investigation data can be found at the following website:

Below, report on the number of catchment investigations completed ***during this reporting period****.*

Number of catchment investigations completed this reporting period: 0

Below, report on the percent of catchments investigated ***to date****.*

Percent of total catchments investigated: 0

Optional: Provide any additional information for clarity regarding the catchment investigations below:

Catchment investigations will be completed in accordance with the General Permit schedule for new permittees.

IDDE Progress

If illicit discharges were found, please submit a document describing work conducted over this reporting period, and cumulative to date, including location source; description of the discharge; method of discovery; date of discovery; and date of elimination, mitigation, or enforcement OR planned corrective measures and schedule of removal.

- (•) No illicit discharges were found
- ( ) The illicit discharge removal report is attached to the email submission
- ( ) The illicit discharge removal report can be found at the following website:

*Below, report on the number of illicit discharges identified and removed, along with the volume of sewage removed **during this reporting period**.*

Number of illicit discharges identified: 0

Number of illicit discharges removed: 0

Estimated volume of sewage removed: 0 gallons/day

*Below, report on the total number of illicit discharges identified and removed to date. At a minimum, report on the number of illicit discharges identified and removed **since the effective date of the permit (July 1, 2018)**.*

Total number of illicit discharges identified: 0

Total number of illicit discharges removed: 0

Optional: Provide any additional information for clarity regarding illicit discharges identified, removed, or planned to be removed below:

Employee Training

Describe the frequency and type of employee training if conducted **during this reporting period**:

The DPW regularly holds "Toolbox Talks" with field staff where drainage infrastructure maintenance best practices are discussed.

MCM4: Construction Site Stormwater Runoff Control

*Below, report on the construction site plan reviews, inspections, and enforcement actions completed **during this reporting period**.*

Number of site plan reviews completed: 4

Number of inspections completed: 0

Number of enforcement actions taken: 0

Optional: Enter any additional information relevant to construction site plan reviews, inspections, and enforcement actions:

The new Stormwater Management Bylaw adopted in May 2021 and associated Stormwater Management Regulations adopted in November 2021 establish the procedures for site plan review, inspections, and enforcement. The Town's peer review consultant completed four site plan reviews in Permit Year 4. There was substantial staff turnover in the Planning and Conservation departments during Permit Year 4, which prevented implementation of a tracking methodology for reviews and inspections. The Planning Board will begin to track these metrics under the Stormwater Management Bylaw for future annual reports.

MCM5: Post-Construction Stormwater Management in New Development and Redevelopment

*As-built Drawings

Describe the status of the measures the MS4 has utilized to require the submission of as-built drawings and ensure long term operation and maintenance of completed construction sites:

The Stormwater Management Bylaw adopted at the Annual Town Meeting in May 2021 and Stormwater Management Regulations adopted in November 2021 require the submission of as-built drawings in Section 31.19 as part of the Final Reports. Any Land Disturbance Permit obtained under the Bylaw must include measures to ensure adequate long-term operation and maintenance of stormwater management design features and BMPs and the Stormwater Authority may choose to impose requirements to ensure compliance.

Street Design and Parking Lots Report

Describe the status of the street design and parking lots assessment including any planned or completed changes to local regulations and guidelines:

An initial assessment for Street Design and Parking Lots Report was completed in Permit Year 4 using the Mass Audubon "Bylaw Review for LID & Climate-Smart, Nature Based Solutions" tool. A summary report documenting the assessment and recommendations will be finalized in Permit Year 5. This requirement is due in Permit Year 6.

Green Infrastructure Report

Describe the status of the green infrastructure report including the findings and progress towards making the practice allowable:

An initial assessment for the Green Infrastructure Report was completed in Permit Year 4 using the Mass Audubon "Bylaw Review for LID & Climate-Smart, Nature Based Solutions" tool. A summary report documenting the assessment and recommendations will be finalized in Permit Year 5. This requirement is due in Permit Year 6.

Retrofit Properties Inventory

Describe the status of the inventory of permittee-owned properties that could be modified or retrofitted with BMPs to mitigate impervious areas and report on any properties that have been modified or retrofitted:

Preparation for the Retrofit Properties Inventory has not yet begun as this requirement is due in Permit Year 6.

MCM6: Good Housekeeping

***Catch Basin Cleaning**

- ○ The catch basin cleaning optimization plan or schedule is not complete
- ◉ The catch basin cleaning optimization plan or schedule is attached to the email submission
- ○ The catch basin cleaning optimization plan or schedule can be found at the following website:

*Below, report on the number of catch basins inspected and cleaned, along with the total volume of material removed from the catch basins **during this reporting period**.*

Number of catch basins inspected: 523

Number of catch basins cleaned: 523

Total volume or mass of material removed from all catch basins: [Select Units]

Below, report on the total number of catch basins in the MS4 system, if known.

Total number of catch basins: 687

If applicable:

Report on the actions taken if a catch basin sump is more than 50% full during two consecutive routine inspections/cleaning events:

No catch basins were found to be more than 50% full as the Town does not use sand for winter road deicing and completes routine catch basin cleaning efforts.
The number of catch basins cleaned and inspected during Permit Year 4 includes catch basins located both in and outside of the urbanized area. However, the majority of all catch basins are within the urbanized area.
The total volume of material removed was not recorded during catch basin cleaning efforts. The Town is working to improve tracking.

***Street Sweeping**

- ○ The written procedures for sweeping streets and municipal-owned lots is not complete

- (●) The written procedures for sweeping streets and municipal-owned lots is attached to the email submission
- ( ) The written procedures for sweeping streets and municipal-owned lots can be found at the following website:

*Report on street sweeping completed **during this reporting period** using one of the three metrics below.*

- (●) Number of miles cleaned: 130
- ( ) Volume of material removed: [Select Units]
- ( ) Weight of material removed: [Select Units]

If applicable:

For rural uncurbed roadways with no catch basins, describe the progress of the inspection, documentation, and targeted sweeping plan:

N/A
Note that the mileage of street sweeping is approximated. Town-wide street sweeping took place in the Spring and Summer of 2022. In Fall 2021, streets within the MS4 urbanized area were swept again.

<u>*O&M Procedures and Inventory of Permittee-Owned Properties</u>

Below, check all that apply.

The following permittee-owned properties have been inventoried:

- ☒ Parks and open spaces
- ☒ Buildings and facilities
- ☒ Vehicles and equipment

The following O&M procedures for permittee-owned properties have been completed:

- ☒ Parks and open spaces
- ☒ Buildings and facilities
- ☒ Vehicles and equipment

<u>*Winter Road Maintenance</u>

- ( ) The written procedures for winter road maintenance including the storage of salt and sand is not complete
- (●) The written procedures for winter road maintenance including the storage of salt and sand is attached to the email submission
- ( ) The written procedures for winter road maintenance including storage of salt and sand can be found at the following website:

<u>*Stormwater Pollution Prevention Plan (SWPPP)</u>

*Below, report on the number of site inspections for facilities that require a SWPPP completed **during this reporting period**.*

Number of site inspections completed:

Describe any corrective actions taken at a facility with a SWPPP:

N/A. There are no applicable facilities within the Town's urbanized area that require a SWPPP.

Part V: Additional Information

***Monitoring or Study Results**

Results from any other stormwater or receiving water quality monitoring or studies conducted during the reporting period not otherwise mentioned above, where the data is being used to inform permit compliance or permit effectiveness must be attached.

- (●) Not applicable
- ( ) The results from additional reports or studies are attached to the email submission
- ( ) The results from additional reports or studies can be found at the following website(s):

If such monitoring or studies were conducted on your behalf or if monitoring or studies conducted by other entities were reported to you, a brief description of the type of information gathered or received shall be described below:

Additional Information

Optional: Enter any additional information relevant to your stormwater management program implementation during the reporting period. Include any BMP modifications made by the MS4 if not already discussed above:

The Town has delegated authority for signing annual reports to the Winchendon DPW Director. See attached documentation.

COVID-19 Impacts

Optional: If any of the above year 4 requirements could not be completed due to the impacts of COVID-19, please identify the requirement that could not be completed, any actions taken to attempt to complete the requirement, and reason the requirement could not be completed below:

Due to material shortages and increased prices of materials, less drainage infrastructure maintenance and repairs could be completed than anticipated.

***Activities Planned for Next Reporting Period**

Please confirm that your SWMP has been, or will be, updated to comply with all applicable permit requirements including but not limited to the year 4 requirements summarized below. (Note: impaired waters and TMDL requirements are not listed below)

Yes, I agree ☒

- Complete IDDE ordinance
- Complete Construction/ Erosion and Sediment Control (ESC) ordinance
- Develop written IDDE plan including a procedure for screening and sampling outfalls
- Develop a written catchment investigation procedure and added the procedure to the SWMP

Annual Requirements

- Annual report submitted and available to the public
- Annual opportunity for public participation in review and implementation of SWMP
- Keep records relating to the permit available for 5 years and make available to the public
- Properly store and dispose of catch basin cleanings and street sweepings so they do not discharge to receiving waters
- Continue public education and outreach program
- Sweep all curbed roadways at least once within the reporting period
- Provide training within the reporting period to employees involved in IDDE program
- Clean catch basins in accordance with catch basin cleaning procedures to ensure that no catch basin is greater than 50% full

Provide any additional details on activities planned for permit year 5 below:

The Town acknowledges the General Permit Year 5 requirements and will complete as many activities as possible based on funding and staff availability.

*Part VI: Certification of Small MS4 Annual Report 2021

40 CFR 144.32(d) Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: Brian Croteau

Title: Director of Public Works

Signature:

[Signatory may be a duly authorized representative]

Date: 9.26.22

September 22, 2022

MEMO TO FILE

Re: Documentation for delegation of "Authorized Representative" for NPDES 2016 Massachusetts Small Municipal Separate Storm Sewer System (MS4) General Permit

This document serves to affirm that the Town of Winchendon **Director of the Department of Public Works** has responsibility for the operation of the MS4 and is hereby designated as an authorized person for signing all reports including but not limited to the Stormwater Management Plan (SWMP), Stormwater Pollution Prevention Plans (SWPPPs), inspection reports, annual reports, monitoring reports, reports on training, and other information required by the General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) in Massachusetts for the Town of Winchendon. This authorization cannot be used for signing a NPDES permit application (e.g., Notice of Intent (NOI)) in accordance with 40 CFR 122.22).

By signing this authorization, I confirm that I meet the following requirements to make such a designation as set forth in Part B.11 of Appendix B of the Small MS4 General Permit:

> *For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official.*

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Justin Sultzbach
Winchendon Town Manager

9.26.22
Date

SSO Inventory (July 1, 2017 – June 30, 2023)
Winchendon, MA

Below is a summary table of sanitary sewer overflows that have occurred in the Town of Winchendon from 2017 through 2022. Following the summary table are detailed descriptions of each SSO occurrence. These SSOs have been reported to MassDEP in accordance with state regulations.

Date	Time	Location	Discharge to surface water or MS4	Estimated SSO Volume	Cause of SSO	Mitigation/Corrective Measures Completed
6/21/2020	3:49 PM – 4:45 PM	Roadway	No	200 gallons	Blockage	See detailed descriptions below
4/17/2017	7:30 AM – 8:15 AM	Spring Street at Hall Road	Yes – MS4 at Whitney Pond	150 gallons	Blockage	
3/22/2017	9:35 AM – 10:33 AM	Summer Street at Spruce Street	Yes – MS4	1,800 gallons	Pipe Collapse	

- No SSOs reported in **FY2023**

- No SSOs reported in **FY2022**

- On **June 21, 2020** at 3:49 PM, the Sewer Department was notified of sewage coming out of a manhole and discharging to the ground surface. After responding and investigating, a blockage was discovered in the sewer system. The total volume of wastewater discharged was estimated to be approximately 200 gallons. Sewer Department staff jetted the line, the blockage cleared, and levels dropped down to normal level. Staff jetted the line again once levels were at normal running level and encountered no additional issues.

- No SSOs reported in **2019**

- No SSOs occurred in **2018**

- On **April 17, 2017** at approximately 7:30 AM, the Sewer Department was notified of sewage coming out of a manhole at the corner of Spring Street and Hall Road. After responding and investigating, a grease blockage in the sewer system was discovered. Sewer Department staff jetted the lines before and after the sewer back up to the lift station, cleared the blockage, and halted the overflow of sewage by 8:15 AM. The total volume of wastewater discharged to the catch basin at Whitney Pond was approximately 150 gallons. Following removal of the blockage, Town staff made sure all was in working order.

- On **March 22, 2017** at approximately 9:35 AM, the Sewer Department was notified of sewage coming out of an open trench from a water repair and being discharged to a catch basin at the corner of Summer Street and Spruce Street. After responding and investigating, a pipe collapse was discovered on Summer Street between Spruce Street and Oak Street. The sewage discharge was stopped by 10:33 AM. A pump truck was used to maintain the flow in an upstream manhole, while the pipe was repaired. The pump truck was then discontinued and the line was tested, and determined to be in working order. The total volume of wastewater discharged to the catch basin at Summer Street and Spruce Street was approximately 1,800 gallons. Town staff made sure that no solids were on the asphalt or in the storm water basin, and the impact area was cleaned.

STANDARD OPERATING PROCEDURE

Catch Basin Cleaning, Inspection, and Disposal

TARGETED POLLUTANTS

Sediment
Nutrients
Trash
Metals
Oil and Grease
Organics
Low Dissolved Oxygen
Bacteria

Catch basins help minimize flooding and protect water quality by removing trash, sediment, decaying debris, and other solids from stormwater runoff. Catch basin cleaning reduces foul odors, prevents clogs in the storm drain system, and reduces the loading of suspended solids, nutrients, and bacteria to receiving waters.

Suggested Standard Operating Procedures

Implement applicable suggested SOPs to reduce the influx of pollutants to the stormwater drainage system to the maximum extent practicable.

- Target cleaning for early spring.
- Clean manually or with equipment (i.e., clamshell or vactor truck).
- Properly dewater and dispose of catch basin material or store until contractor picks up cleanings (see "Management of Catch Basin Cleanings").
- Repair damaged catch basins including frames and grates.
- Install hoods if catch basins do not have them.
- Inform employees that catch basins are part of the stormwater drainage system and not the sanitary sewer system.
- The DPW should maintain an inventory of cleaning activities. Information should at a minimum include amount of cleanings removed and areas with heavily filled basins.
- Facilities should maintain a log of cleaning activities on their parking lots. Information should include date of cleaning activities, staff/ contractor that performs activities, number of basins cleaned, illicit connection/odor issues, repair issues, or heavily filled catch basins.
- Report any illicit (illegal) discharges to the DPW. Report oil spills immediately to the Fire Department and DPW.

Optimization of Inspection & Cleaning

Section 2.3.7.a.iii.2 of the 2016 Small MS4 General Permit requires that Winchendon optimize routine inspections, cleaning, and maintenance of catch basins within the MS4 to meet the following criteria:

- Prioritize inspection and maintenance for catch basins located near construction activities and clean catch basins more frequently if excessive sediment or debris loadings is found.
- Establish a catch basin cleaning schedule that ensures no catch basin is ever more than 50 percent full.

The Town hires a contractor to clean the catch basins and dispose of the material at the Templeton Wastewater Treatment Plant, where it is used as sludge cover. If this disposal practice changes in the future, the cleanings must be disposed of as solid waste according to MassDEP guidelines, which are included at the end of this SOP.

The Town will work to optimize routine inspections, cleaning, and maintenance of catch basins within the MS4 as follows:

- Winchendon, via its contractor, will clean all catch basins located within the MS4 urbanized area a minimum of one time per year.
- The Town and/or its contractor will continue to track the number of catch basins cleaned per street and the approximate volume of material removed (see an example tracking spreadsheet from Permit Year 1 below).

MS4 - BASIN CLEANING - JULY 1, 2018 - JUNE 30,2019

DATE	STREET	YARDS	# DONE	DRIVER	COMPANY
8-9-18	EAGLE RD	1.5	8	SAL	Sams
	Front st	8	22		
	School st	3	16		
8-14-18	River st.	4	17	SAL	SAMS
	Hill st	1	2		
	BENJAMIN	2	4		

- The Town will provide its contractor with educational materials about illicit discharges and the Town's reporting protocols so any instances of illicit discharges or connections observed in the field can be reported and tracked. A laminated version of the enclosed *Pocket Guide to Illicit Discharges* should be given to and reviewed with contractors and/or Town field staff prior to completing catch basin cleaning work.

Reporting

- Report any repair or maintenance problems to the DPW. Repair problems may include frame and grate replacement.
- Keep a log of catch basins cleaned or inspected.
- Report in each annual report the total number of catch basins, number inspected, number cleaned, and the total volume or mass of material removed from all catch basins.

MassDEP **Management of Catch Basin Cleanings** (Source: https://www.mass.gov/lists/massdep-solid-waste-policies-guidance-fact-sheets#managing-specific-solid-wastes-)

Catch basin cleanings - solid materials such as leaves, sand and twigs removed from stormwater collection systems during cleaning operations - are typically classified as a solid waste by the Department of Environmental Protection (MassDEP). Catch basin cleanings must be handled and disposed in accordance with the agency's applicable regulations, policies and guidance.

Handling and Disposal

Except as explained below, catch basin cleanings from stormwater-only drainage systems may be disposed at any landfill that is permitted by MassDEP to accept solid waste. MassDEP does not routinely require stormwater only catch basin cleanings to be tested before disposal, unless there is evidence that they have been contaminated by a spill or some other means. Contaminated catch basin cleanings must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.000, and handled as hazardous waste if appropriate. Systems that collect stormwater run-off into sanitary sewers are called "combined sewers." MassDEP may require cleanings from combined sewer catch basins to be tested before disposal.

Landfill Restrictions

The MassDEP 310 CMR 19.000: Solid Waste Management Facility Regulations (specifically see Section 19.130(7)) prohibit Massachusetts landfills from accepting materials that contain free draining liquids. When there is no free water in a truck used to transport catch basin cleanings, the agency will generally be satisfied that the material is sufficiently dry. Otherwise, the material will need to undergo a Paint Filter Liquids Test. One way to remove liquids is to use a hydraulic lift truck during catch basin cleaning operations so that the material can be decanted at the site. After material from several catch basins along the same system is loaded, the truck may be elevated so that any free draining liquid is allowed to flow back into the drainage structure. MassDEP may approve catch basin cleanings for use as grading and shaping material at landfills undergoing closure (see the agency's Revised Guidelines for Determining Closure Activities at Inactive Unlined Landfill Sites for additional information). Catch basin cleanings may be used as daily cover or grading material at active landfills only with specific MassDEP approval of the proposed use. Consult with the Solid Waste Section Chief in the appropriate MassDEP Regional Office for information about applying for an approval and/or a Beneficial Use Determination (see Section 19.060 of the 310 CMR 19.000: Solid Waste Management Facility Regulations) for other uses, including non-landfill uses.

Implementation Schedule

- In accordance with General Permit requirements for new permittees, this SOP must be adopted and implemented by the end of Permit Year 4 (June 30, 2022).
- The Town must always properly store and dispose of catch basin cleanings such that they do not discharge to receiving waters.

Attachments

1. *Pocket Guide to Illicit Discharges*

Pocket Guide to

Illicit Discharges

When cleaning a catch basin or doing infrastructure maintenance, if you see or smell any of the following, please call:

Name: Brian Croteau

Title: Public Works Director

Phone: 978-297-5411

For Imminent Emergency Situations where there is an immediate risk to public health and safety: Call 911

Tighe&Bond

www.tighebond.com

Pocket Guide to

Illicit Discharges

When cleaning a catch basin or doing infrastructure maintenance, if you see or smell any of the following, please call:

Name: Brian Croteau

Title: Public Works Director

Phone: 978-297-5411

For Imminent Emergency Situations where there is an immediate risk to public health and safety: Call 911

Tighe&Bond

www.tighebond.com

STANDARD OPERATING PROCEDURE

Sweeping Streets and Town-Owned Parking Lots

TARGETED POLLUTANTS

Sediments
Nutrients
Trash
Metals
Salt
Oil and Grease
Organics

MASSDEP REUSE & DISPOSAL OF STREET SWEEPINGS SOURCE:

http://www.mass.gov/eea/docs/dep/recycle/laws/stsweep.pdf

Suggested Standard Operating Procedures

- Adhere to the Town's cleaning schedule.
- Town/facility parking lots should be checked regularly by Facility personnel and swept in the spring. If needed, increase sweeping frequency if excessive sediment accumulates.
- Street sweeping should be conducted in dry weather. Sweeping should not be conducted during or immediately after rain storms.
- Any visible sediment should be swept up (including sand/salt mixtures and granular material).
- Sweep up the smallest particles feasible.
- Sweep in pattern to keep spilled material from being pushed into catch basins.
- Adjust broom frequently to maximize efficiency of sweeping operations.
- Do not use kick brooms or sweeper attachments that tend to spread dirt.
- When unloading sweepers, make sure there is no dust or sediment release.
- After sweeping is finished, ensure sweepings are properly stored and disposed of.
- Inspect Town-owned sweepers regularly to check for any necessary repairs or maintenance.

Required Inspection and Frequency of Sweeping

The Town must sweep and/or clean all streets (with the exception of rural uncurbed roads with no catch basins or high speed limited access highways) and Town-owned parking lots within the MS4 at a minimum of **once per year in the spring**.

Consider more frequent sweeping for targeted areas based on pollutant load reduction potential, inspections, pollutant loads, catch basin cleaning or inspection results, land use, impaired waters, or other factors. In addition, the Town should complete the following increased sweeping witin the MS4 to comply with General Permit requirements:

- Due to the Long Island Sound TMDL for nitrogen, the Town must increase sweeping frequency of **all municipal streets and parking lots within the MS4** to a minimum of **twice per year**, once in the spring following winter deicing activities and once in the fall following leaf fall, to reduce the discharge of nitrogen in stormwater runoff. Winchendon is located within the Millers River Basin, which is part of the Connecticut River watershed. This watershed drains to the Long Island Sound.

For rural uncurbed roads with no catch basins and limited access highways in the MS4, the Town must either sweep once per year in the spring or develop and implement an inspection, documentation, and targeted sweeping plan. Since the Town of Winchendon sweeps all streets in the MS4 at least once per year in the spring, this is not applicable. A map of the streets located within the MS4 is attached.

Reporting

- Maintain a log or schedule of sweeping activities conducted. A log developed for Winchendon is attached. Information should include the date of sweeping activities, staff/contractor that performs activities, sweeping method (mechanical vs vacuum), and any comments such as amount of sweepings removed and heavily sedimented roadways. By recording heavily sedimented areas, prioritizations can be made to sweep these areas or clean catch basins more frequently. Any maps of areas swept should be kept on file.
- Facilities should maintain a log or schedule for their facility parking lots. A log developed for Winchendon is attached. Information should include the date of sweeping activities, staff/contractor who performs activities, sweeping method (mechanical or vac), and any comments such as amount of sweepings removed and heavily sedimented catch basins. By recording heavily sedimented areas, prioritizations can be made to sweep these areas or clean catch basins more frequently.
- Report in the annual MS4 report the number of miles cleaned, the volume of material removed, or the mass of material removed.

Storage, Reuse, and Disposal of Street Sweepings

- In Winchendon, temporary storage of solid sweeping debris is on an impervious surface that is protected from runoff at the DPW Garage at 101 Glenallen Street. The Town disposes of the material at the Templeton Wastewater Treatment Plant, where it is used a sludge cover in accordance with MassDEP guidelines.
- If the Town wishes to reuse the street sweepings in the future, the MassDEP Reuse and Disposal of Street Sweepings Policy (attached) will be followed.

Implementation Schedule

- In accordance with General Permit requirements for new permittees, this SOP must be adopted and implemented by the end of Permit Year 4 (June 30, 2022).
- The Town must always properly store and dispose of street sweepings such that they do not discharge to receiving waters.

Attachments

1. MS4 Street Sweeping Map
2. Street and Parking Lot Sweeping Log
3. MassDEP Guidance Document, *Reuse and Disposal of Street Sweepings, Department of Environmental Protection Policy #BAW-18-001* (May 14, 2018).

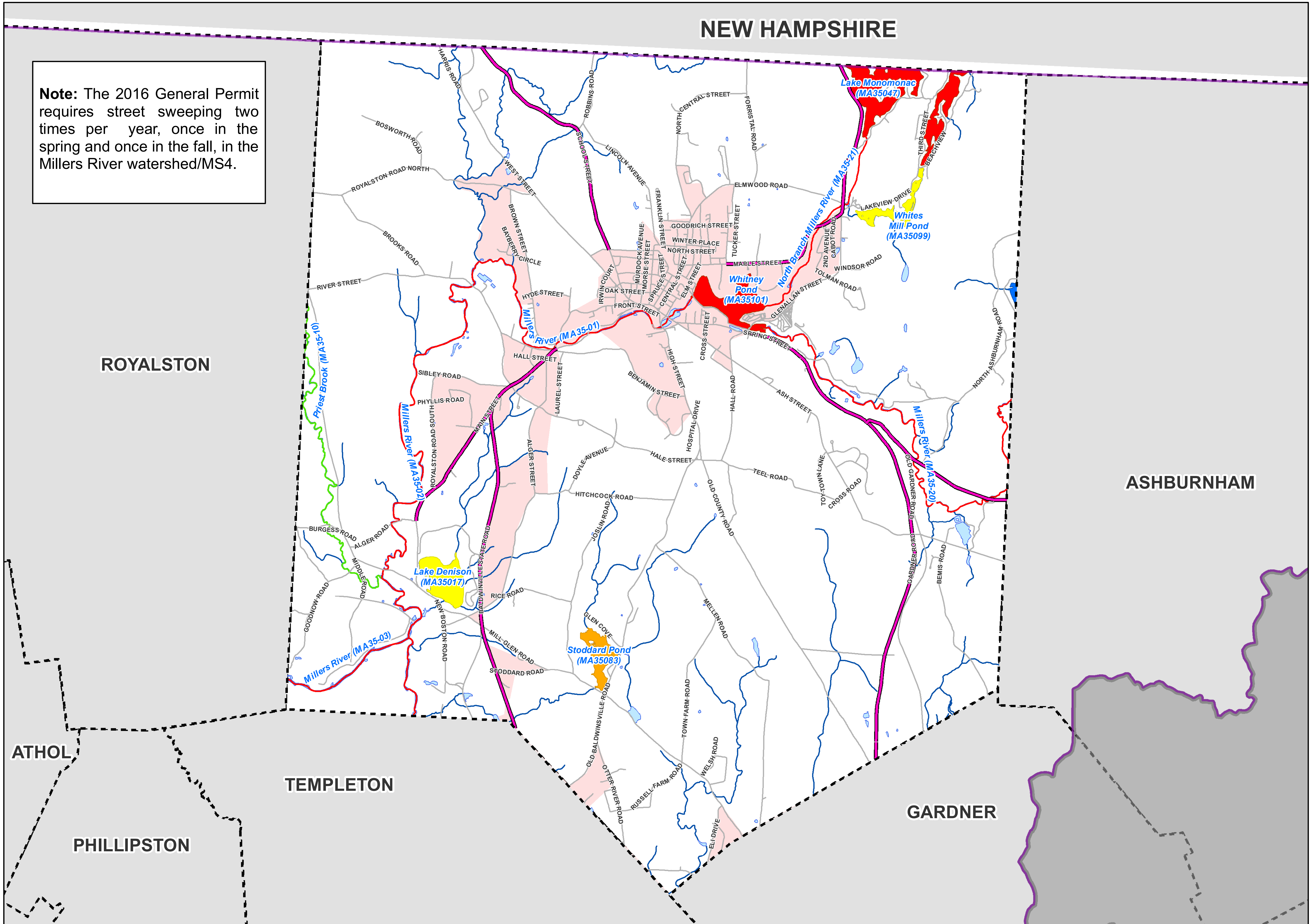


FIGURE 1
STREET SWEEPING MAP

- Millers Watershed
- Other Watersheds
- Town Boundary
- State Roads
- Roads

2016 Integrated List Data - 305(b)/314/303(d)

- 2 - Attaining some uses; other uses not assessed
- 5 - Impaired - TMDL required
- 3 - No uses assessed
- 4A - Impaired - TMDL is completed
- 4C - Impairment not caused by a pollutant
- 5 - Impaired - TMDL required
- Public Surface Water Supply (PSWS)
- Water Bodies
- Urbanized

LOCUS MAP

0 0.25 0.5 1
Miles

1:54,000

NOTES

1. MassGIS: US EPA Urban Area Census (2000 and 2010), Major Drainage Basins (2003), Community Boundary (2017), MassDEP Hydrography (1:25,000) (2017), MassDOT Major Roads (2014), 2016 Integrated List Data (2020)

MS4 Street Sweeping
Winchendon, Massachusetts

February 2021

Tighe&Bond

G:\GIS\MA\WinchendonMA\avproj\StreetSweepingMap_Winchendon.mxd Date Saved: 2/12/2021 User: JWebb

Street and Parking Lot Sweeping Log
Winchendon, Massachusetts

Date	Operator	Sweeping Method [1]	Streets and/or Parking Lots Swept	Number of Miles Swept [2]	Volume / Mass of Material Removed [2]

Notes:

1. Typical sweeping methods include one of the following. The abbreviations can be used in this sweeping log.
   a. Mechanical Broom (MB)
   b. Vacuum Assisted (VA)
   c. High-Efficiency Regenerative Air Vacuum (RA)
2. The General Permit requires that the Town track and report in each annual report the number of miles cleaned OR the volume of material removed OR the mass of volume removed. The Town can determine which method to track in this sweeping log.

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

One Winter Street Boston, MA 02108 • 617-292-5500

REUSE AND DISPOSAL OF STREET SWEEPINGS

DEPARTMENT OF ENVIRONMENTAL PROTECTION

POLICY # BAW-18-001

(SUPERSEDES POLICY # BWP-94-092)

This Policy provides guidance to the regulated community about the Department of Environmental Protection's requirements, standards, and approvals for handling reuse or disposal of street sweepings. This Policy supersedes Department Policy BWP-94-092.

5/14/18
Date

Christine Kirby
Assistant Commissioner

POLICY #BAW-18-001
TABLE OF CONTENTS

1. Policy Statement and Scope

This Policy explains MassDEP requirements for managing Street Sweepings. Street Sweepings are “solid waste” subject to the Massachusetts solid waste regulations. The options for managing Street Sweepings are as follows.

- Use the Street Sweepings in accordance with the preapproved uses described in Section 4 of this policy.
- Use the Street Sweepings for a beneficial use not included in the list of preapproved uses after obtaining a permit from MassDEP under the provisions of the solid waste regulations, 310 CMR 19.060, Beneficial Use of Solid Wastes.
- Dispose of Street Sweepings at a permitted solid waste landfill.

2. Applicability

This policy applies to the reuse or disposal of Street Sweepings that are generated in the ordinary and customary cleaning of roadways and parking lots. This policy does not apply to catch basin cleanings or Street Sweepings mixed with catch basin cleanings or any other type of wastes. The disposal and reuse of catch basin cleanings is discussed in the “Management of Catch Basin Cleanings” Fact Sheet issued by the MassDEP (https://www.mass.gov/lists/massdep-solid-waste-policies-guidance-fact-sheets).

This policy does not apply to the material generated as the result of the clean-up of an oil or hazardous material spill. However, Street Sweepings that are generated in the ordinary and customary maintenance of roadways and parking lots are not exempt from the Hazardous Waste Regulations, 310 CMR 30.000, and must be handled as hazardous waste when they exhibit any of the characteristics of a hazardous waste. If there is no evidence of unusual contamination, MassDEP does not require Street Sweepings to be routinely tested, but, as is the case with any waste, the generator has the ultimate responsibility for determining whether the waste is a hazardous waste.

Although Street Sweepings are not considered soil, they may be managed under Policy #COMM-97-001, “Reuse and Disposal of Contaminated Soil at Massachusetts Landfills”, in accordance with Section 5.5 of this policy.

3. Definitions

This section contains definitions of the important terms used in this Policy.

Department or *MassDEP* means the Massachusetts Department of Environmental Protection.

Parking lots mean publicly or privately owned paved areas that provide access for the general public to park their car while patronizing retail or service businesses. Parking lots also include the paved areas used by the employees at office parks and businesses.

Private way means the strip of land over and under a privately owned, paved road or highway.

Public way means the strip of land over and under a publicly owned, paved road or highway and includes the publicly owned land adjacent to the road or highway.

Street Sweepings means materials consisting primarily of sand and soil generated during the routine cleaning of roadways or parking lots but may also contain some leaves and other miscellaneous solid wastes collected during street sweeping. Street Sweepings do not include the material generated during the clean-up of a spill or material from other structures associated with a roadway such as catch basins.

Urban center roads mean local roads in central commercial and retail business districts and industrial and manufacturing areas.

4. Handling

4.1 Collection of Street Sweepings

Although MassDEP does not regulate the collection of Street Sweepings, collection practices should be compatible with intended uses. Keeping sweepings from Urban Center Roads separate from sweepings from other areas will provide the generator of the Street Sweepings with the most options under this policy.

This policy does not cover sweepings known to be contaminated by spills, and such sweepings should be collected separately and kept segregated. Depending on the contamination and circumstances, the handling of contaminated sweepings may be governed by the Massachusetts Contingency Plan, 310 CMR 40.0000, the Massachusetts Hazardous Waste Regulations, 310 CMR 30.000, the Massachusetts Site Assignment Regulations for Solid Waste Facilities, 310 CMR 16.00 or the Massachusetts Solid Waste Management Facility Regulations, 310 CMR 19.000.

4.2 Storage

Street Sweepings shall be temporarily stored prior to use, only when the following conditions are satisfied:

- Storage must be:
    - at the site where the sweepings are generated (e.g. at a parking area that was swept);
    - at a location, such as a Department of Public Works (DPW) yard, that is under the control of the governmental entity doing the sweeping or has contracted for the sweeping; or,

  - at other locations with prior written approval from the appropriate MassDEP Regional Office.
- The Street Sweepings shall be protected from wind and rain to the extent necessary to prevent dust, erosion, and off-site migration;
- The Street Sweepings shall not be stored within the 100 foot buffer zone of a wetland or within wetland resource areas including bordering vegetative wetlands and riverfront areas;
- The Street Sweepings shall not be stored within 500 feet of a ground or surface drinking water supply;
- Storage of the Street Sweepings shall incorporate good management practice and result in no public nuisance; and
- Storage of the Street Sweepings must be temporary. Street Sweepings shall be used within one year of collection unless the MassDEP Regional Office where the Street Sweepings are stored grants a written extension. An extension may be granted when it is demonstrated that all storage conditions will continue to be satisfied and the stored Street Sweepings will be put to a specific identified use prior to the expiration of the extension period.

4.3 Preparation Prior to Use

Solid waste, such as paper, auto parts and other trash, shall be removed from all Street Sweepings prior to use. Solid waste screened from the Street Sweepings shall be disposed of at a permitted solid waste facility. Leaves, twigs and other organic matter should also be removed when good engineering practice indicates this is necessary to produce a material that is suitable for the intended use.

5. Approved Uses, Restrictions & Conditions-No Prior Approval Needed from MassDEP

This policy allows Street Sweepings to be used in several applications. An approval from MassDEP is not required when the restrictions and conditions are adhered to as identified in this policy. However, Street Sweepings shall not be used unless prior approval is obtained from the owner of the location where the sweepings are to be used.

5.1 Use at Landfills

Street Sweepings may be used for daily cover at permitted lined solid waste landfills and need no prior MassDEP approval if the Street Sweepings satisfy the requirements for daily cover material specified at 310 CMR 19.130(15). A list of active permitted solid waste landfills can be found on the MassDEP website.

5.2 Use as Fill in Public or Private Ways and Parking Lots

Street Sweepings may be used for fill in public and private ways and parking lots without prior approval from MassDEP only when the following additional restrictions and conditions are observed:

- The Street Sweepings have not been collected from Urban Center Roads (see definition);
- Any collection, storage, or preparation for use of the Street Sweepings shall be in accordance with Sections 4.1 and 4.2 of this policy.
- The Street sweepings have been screened to remove all debris and solid waste and all debris/solid waste screened from the sweepings shall be disposed at a permitted solid waste facility (see Section 8);
- The Street Sweepings are kept above the level of the groundwater;
- The Street Sweepings are not used in designated "No Salt Areas";

- The Street Sweepings are not used within the 100 foot buffer zone of a wetland or within wetland resource areas including bordering vegetative wetlands and riverfront areas;
- The Street Sweepings are not used within 500 feet of a ground or surface drinking water supply;
- In public ways the Street Sweepings are used under the paved road surface or, except in residential areas, as fill along the side of the road within the public way;
- In private roadways or in residential areas the Street Sweepings are used only under the paved road surface; and
- In parking lots the Street Sweepings are used only under the paved parking surface.

5.3 Use As an Additive to Restricted Use Compost

Street Sweepings may be used as an additive to compost without prior written approval from MassDEP only when the following additional restrictions and conditions are observed:

- The Street Sweepings have not been collected from Urban Center Roads (see definition);
- Any collection, storage, or preparation for use of the Street Sweepings shall be in accordance with Sections 4.1 and 4.2 of this policy.
- The Street Sweepings have been screened to remove all debris and solid waste and all debris and solid waste screened from the sweepings is disposed at a permitted solid waste facility (see Section 8);
- The compost is used only along public ways and parking lot areas;
- The compost is not used in residential areas;
- The compost is kept above the level of the groundwater;
- The compost is not used in designated "No Salt Areas";
- The compost is not used within the 100 foot buffer zone of a wetland or within wetland resource areas including bordering vegetative wetlands and riverfront areas; and
- The compost is not used within 500 feet of a ground or surface drinking water supply.

5.4 Reuse as Anti-Skid Material

Street Sweepings may be used as a component to anti-skid material (e.g. street sanding material) without prior written approval from MassDEP only when the following additional restrictions and conditions are observed:

- The Street Sweepings have not been collected from Urban Center Roads (see definition);
- Any collection, storage, or preparation for use of the Street Sweepings shall be in accordance with Sections 4.1 and 4.2 of this policy;
- The Street Sweepings have been screened to remove all debris and solid waste and all debris and solid waste screened from the Street Sweepings is disposed at a permitted solid waste facility (see Sections 8);
- The anti-skid material/Street Sweepings are not used in designated "No Salt Areas";
- The anti-skid material/Street Sweepings are not used within the 100 foot buffer zone of a wetland or within wetland resource areas including bordering vegetative wetlands and riverfront areas; and
- The anti-skid material/Street Sweepings are not used within 500 feet of a ground or surface drinking water supply.

The use of Street Sweepings as anti-skid material in accordance with this policy is not a determination of the efficacy of the material for this purpose. Proper engineering review should be done to ensure the material works as intended.

5.5 Reuse at Landfills Regulated Under MassDEP Policy #COMM-97-001

Street Sweepings may be reused at a permitted Massachusetts landfill and need no prior written MassDEP approval if the sweepings have been adequately characterized pursuant to the MassDEP Policy #COMM-97-001 and the Street Sweepings have been screened to remove debris and solid waste.

All screened debris and solid waste removed from Street Sweepings shall be disposed of at a permitted solid waste facility. Street Sweepings for use at the landfill may contain only incidental, randomly dispersed, de minimis quantities of ash and/or Solid Waste as defined in 310 CMR 16.000 and 310 CMR 19.000, which collectively shall comprise less than 1% by volume of the Street Sweeping materials, as determined by visual inspections. Any Street Sweeping materials approved and brought onto the landfill property for use at the landfill shall contain no more than 5% (by volume) of Asphalt Pavement, Brick, and Concrete ("ABC") material (as defined in 310 CMR 19.000), as determined by visual inspection. Any such material must measure less than 6 inches in any dimension.

Persons who wish to send Street Sweepings to a landfill must comply with MassDEP Policy #COMM-97-001 which requires sampling of the Street Sweepings to demonstrate that the Street Sweepings meet the standards listed in the Policy.

5.6 Use at Reclamation Soil Facilities Regulated Under MassDEP Policy # COMM-15-01

Street Sweepings may be used for fill at a permitted Reclamation Soil Facility (the Facility) and need no prior written MassDEP approval if the Street Sweepings have been adequately characterized pursuant to the Facility-specific Soil/Fill Management Plan and the Street Sweepings have been screened to remove debris and solid waste.

All screened debris and solid waste removed from Street Sweepings shall be disposed of at a permitted solid waste facility. Street Sweepings for use at the Facility may contain only incidental, randomly dispersed, de minimis quantities of ash and/or Solid Waste as defined in 310 CMR 16.000 and 310 CMR 19.000, which collectively shall comprise less than 1% by volume of the Street Sweeping materials, as determined by visual inspections. Any Street Sweeping materials approved and brought onto the property for use at the Facility shall contain no more than 5% (by volume) of ABC material, as determined by visual inspection. Any such material must measure less than 6 inches in any dimension.

Pursuant to Policy # COMM-15-01, persons who wish to send Street Sweepings to a Facility must sample and analyze the Street Sweepings as required by the Facility's Soil/Fill Management Plan and demonstrate that the Street Sweepings meets the Facility's acceptance criteria. Unless specifically addressed in a Facility's Soil/Fill Management Plan, a minimum sampling frequency of 1 sample per 100 cubic yards is required for characterization of Street Sweepings originating from Urban Center Roads. Street Sweepings originating from non-Urban Center Roads may be sampled at a minimum of 1 sample per 500 cubic yards. Regardless of its point of origin, if the total quantity of Street Sweepings is less than 100 cubic yards, a minimum of one composite sample is required for characterization of the material. A list of active permitted Reclamation Soil facilities may be found at https://www.mass.gov/soil-transport-re-use-and-disposal.

6. Approved Use, Restrictions & Conditions- Prior Approval Needed from MassDEP

This policy allows Street Sweepings to be used in several applications. Prior written approval from MassDEP is required when using the Street Sweepings as identified in this section of the policy. In addition, Street Sweepings shall not be used at a location until prior written approval is obtained from the owner of the location where the Street Sweepings are to be used.

6.1 Use as a Bulking Agent for Wastewater Sludge or Septage Disposal

Street Sweepings may be used as a bulking material for wastewater treatment plant sludge or septage when the mixed material will be disposed in a permitted lined or unlined sludge or septage landfill in compliance with MGL Chapter 21, Sections 26-53 and MGL Chapter 83 Sections 6 & 7 provided that the appropriate MassDEP Regional Office's Bureau of Water Resources has granted prior written approval.

7. Other Uses

Any use not approved in this policy requires a MassDEP permit under the Beneficial Use provisions of the Solid Waste Management Facility Regulations at 310 CMR 19.060. A "Beneficial Use Determination" (BUD) can be issued only after the submission of an application characterizing the waste and describing the proposed beneficial use.

8. Disposal

While the beneficial use of Street Sweepings is strongly encouraged, MassDEP does not prohibit the disposal of Street Sweepings. Street Sweepings may be disposed in permitted solid waste landfills without prior approval from the Department.

9. Record Keeping

Any entity using Street Sweeping for any use listed under sections 5.3 or 5.4 shall keep records for a period of three years of the source of the sweepings, the location of use and the amount of sweepings used.

10. Additional Information

For additional copies of this policy, permit application forms or other MassDEP documents, call any MassDEP Regional Office and ask for the Service Center or visit http://www.mass.gov/dep. The permit application numbers for Beneficial Use Determinations are BWP SW 39, 40, 41 and 42.

Copies of all Massachusetts regulations, including the solid waste regulations, are available at the MassDEP website and may also be purchased from the State House Bookstore at 617-727-2834. The solid waste regulations are:

- 310 CMR 16.000, Site Assignment Regulations for Solid Waste Facilities: and,
- 310 CMR 19.000, Solid Waste Management Facility Regulations.

If you have technical questions about the policy, please call any MassDEP Regional Office and ask to speak with a staff member in the solid waste program

TARGETED POLLUTANTS

Sediments
Nutrients
Trash
Metals
Bacteria
Oil and Grease
Organics
Salt
Low Dissolved Oxygen

Application and Storage of Road Salt

The Town of Winchendon Public Works Department typically uses salt in deicing operations.

Proper road salt applications and storage are necessary to prevent contamination to surface and groundwater supplies. Salts are very soluble—once in contact with water there is no way to remove salt. The major reasons for keeping salt covered and controlling use are that salt:

- Kills vegetation
- Corrodes infrastructure
- Blocks storm drains and swales
- Increases sedimentation to streams and rivers
- Some salts contain phosphorus, nitrogen, copper, and cyanide

Proper Storage

Prevent exposure of deicing product (salt, sand, or alternative products) storage piles to precipitation by enclosing or covering the storage piles. The Town stores salt and sand used for municipal deicing in covered storage sheds at the Public Works Garage at 101 Glenallen Street. For other facilities with deicing product stockpiles, follow these key elements:

- Cover or enclose piles and locate on impervious surfaces.
- Drainage should be diverted away from the storage location.
- Salt and sand handling should be completed within the storage facility.
- Frequently sweep near the storage/loading areas to reduce the amount of salt, sand, or other materials that is tracked out.
- For liquid deicing chemicals, provide secondary storage containment.
- Do not store road salt near drinking water supplies, surface water resources, groundwater resources, recharge areas, wells, or flood zones. Follow proper storage guidelines from MassDEP.

Proper Disposal

Salt and/or sand should not be disposed of in wetlands, buffer zones, or other sensitive areas; surface waters; or well locations or public drinking water supplies.

Proper Operations

- Establish a low salt area near any waterbodies or water supply areas. Use alternative materials, such as sand or gravel in especially sensitive areas.
- Regulate the amount of road salt applied to prevent over-salting of motorways and increasing runoff concentrations.
- Calibrate equipment to reduce and optimize salt use.

- Inspection Procedures
- Inspect salt storage shed for leaks on a regular basis.

- Inspect surface areas for evidence of runoff – salt stains on the ground near and around the salt storage shed, loading area, or downslope.
- Inspect salt application equipment on a regular basis, including calibration equipment and spreaders.
- Inspect salt regularly for lumping or water contamination.
- Inspect for excessive amounts of salt on roads.

Maintenance Procedures

- Service trucks and calibrated spreaders regularly to ensure accurate, efficient distribution of salt.
- Educate and train operators on hazards of over-salting to roads and environment at the beginning of the snow season.
- Repair any salt shed leaks.

Snow Removal and Stockpiling

Proper snow management in terms of stockpiling and removal can prevent or minimize runoff and pollutant loading impacts. Snow piles can contain trash, nutrients, sediments, salt, sand, and vehicle pollutants (petroleum, antifreeze, and oil) that can directly be carried into surface waters during snowmelt.

Best Management Practices

The Town of Winchendon typically leaves snow in place during plowing operations. When necessary, the Town of Winchendon stockpiles snow at the town landfill, as approved by MassDEP. During extreme conditions when stockpiling at another location is necessary, the following practices should be applied:

- Do not stockpile snow near or within direct drainage to surface waters.
- Do not stockpile snow in wooded areas, around trees, or in vegetated buffer zones due to sediment and salt damage to vegetation.
- Stockpile snow in pervious areas where it can slowly infiltrate.
- During plowing activities on pervious surfaces, blading (lowering plow blade below ground surface level and plowing the upper layers of soil in addition to overlying snow) should be avoided to prevent erosion.

Inspection Procedures

- Check snow piles for debris that could be windblown and remove.
- Inspect stockpile areas in the spring and remove trash and debris.

Maintenance Procedures

- Contain sediment as stockpiled snow melts, including sweeping roadways, parking lots, and other impervious areas.
- During plowing activities, avoid blocking drainage structures, including catch basins, swales, and channels.

MassDEP has published Snow Disposal Guidance online with an interactive map to assist with designation of appropriate upland snow disposal sites. The Guidance document is also attached to this SOP.

MassDEP Guidance

- MassDEP, Guidelines on Road Salt Storage, *https://www.mass.gov/guides/guidelines-on-road-salt-storage*
- MassDEP Snow Disposal Guidance (attached), *https://www.mass.gov/guides/snow-disposal-guidance*

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

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Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Kathleen A. Theoharides
Secretary

Martin Suuberg
Commissioner

Massachusetts Department of Environmental Protection
Bureau of Water Resources
Snow Disposal Guidance

Effective Date: December 11, 2020

Applicability: Applies to all federal, state, regional and local agencies, as well as to private businesses.

Supersedes: Bureau of Resource Protection (BRP) Snow Disposal Guideline No. BRPG97-1 issued December 12, 1997 and BRPG01-01 issued March 8, 2001; Bureau of Water Resources (BWR) snow disposal guidance issued December 21, 2015 and December 12, 2018.

Approved by: Kathleen Baskin, Assistant Commissioner, Bureau of Water Resources

PURPOSE: To provide guidelines to all government agencies and private businesses regarding snow disposal site selection, site preparation and maintenance, and emergency snow disposal options that are protective of wetlands, drinking water, and water bodies, and are acceptable to the Massachusetts Department of Environmental Protection (MassDEP), Bureau of Water Resources.

APPLICABILITY: These Guidelines are issued by MassDEP's Bureau of Water Resources on behalf of all Bureau Programs (including Drinking Water Supply, Wetlands and Waterways, Wastewater Management, and Watershed Planning and Permitting). They apply to all federal agencies, state agencies, state authorities, municipal agencies and private businesses disposing of snow in the Commonwealth of Massachusetts.

INTRODUCTION

Finding a place to dispose of collected snow poses a challenge to municipalities and businesses as they clear roads, parking lots, bridges, and sidewalks. While MassDEP is aware of the threats to public safety caused by snow, collected snow that is contaminated with road salt, sand, litter, and automotive pollutants such as oil also threatens public health and the environment.

As snow melts, road salt, sand, litter, and other pollutants are transported into surface water or through the soil where they may eventually reach the groundwater. Road salt and other pollutants can contaminate water supplies and are toxic to aquatic life at certain levels. Sand washed into waterbodies can create sand bars or fill in wetlands and ponds, impacting aquatic life, causing flooding, and affecting our use of these resources.

There are several steps that communities can take to minimize the impacts of snow disposal on public health and the environment. These steps will help communities avoid the costs of a contaminated water supply, degraded waterbodies, and flooding. Everything that occurs on the land has the potential to impact the Commonwealth's water resources. Given the authority of local government over the use of the land, municipal officials and staff have a critically important role to play in protecting our water resources.

The purpose of these guidelines is to help federal agencies, state agencies, state authorities, municipalities and businesses select, prepare, and maintain appropriate snow disposal sites before the snow begins to accumulate through the winter. Following these guidelines and obtaining the necessary approvals may also help municipalities in cases when seeking reimbursement for snow disposal costs from the Federal Emergency Management Agency is possible.

RECOMMENDED GUIDELINES

These snow disposal guidelines address: (1) site selection; (2) site preparation and maintenance; and (3) emergency snow disposal.

1. SITE SELECTION

The key to selecting effective snow disposal sites is to locate them adjacent to or on pervious surfaces in upland areas or upland locations on impervious surfaces away from water resources and drinking water wells. At these locations, the snow meltwater can filter into the soil, leaving behind sand and debris which can be removed in the spring. The following conditions should be followed:

- Within water supply Zone A and Zone II, avoid storage or disposal of snow and ice containing deicing chemicals that has been collected from streets located outside these zones. Municipalities may have a water supply protection land use control that prohibits the disposal of snow and ice containing deicing chemicals from outside the Zone A and Zone II, subject to the Massachusetts Drinking Water Regulations at 310 CMR 22.20C and 310 CMR 22.21(2).
- Avoid storage or disposal of snow or ice in Interim Wellhead Protection Areas (IWPA) of public water supply wells, and within 75 feet of a private well, where road salt may contaminate water supplies.
- Avoid dumping snow into any waterbody, including rivers, the ocean, reservoirs, ponds, or wetlands. In addition to water quality impacts and flooding, snow disposed of in open water can cause navigational hazards when it freezes into ice blocks.
- Avoid dumping snow on MassDEP-designated high and medium-yield aquifers where it may contaminate groundwater.
- Avoid dumping snow in sanitary landfills and gravel pits. Snow meltwater will create more contaminated leachate in landfills posing a greater risk to groundwater, and in gravel pits, there is little opportunity for pollutants to be filtered out of the meltwater because groundwater is close to the land surface.

- Avoid disposing of snow on top of storm drain catch basins or in stormwater drainage systems including detention basins, swales or ditches. Snow combined with sand and debris may block a stormwater drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.

Recommended Site Selection Procedures

It is important that the municipal Department of Public Works or Highway Department, Conservation Commission, and Board of Health work together to select appropriate snow disposal sites. The following steps should be taken:

- Estimate how much snow disposal capacity may be needed for the season so that an adequate number of disposal sites can be selected and prepared.
- Identify sites that could potentially be used for snow disposal, such as municipal open space (e.g., parking lots or parks).
- Select sites located in upland locations that are not likely to impact sensitive environmental resources first.
- If more storage space is still needed, prioritize the sites with the least environmental impact (using the site selection criteria, and local or MassGIS maps as a guide).

Snow Disposal Mapping Assistance

MassDEP has an online mapping tool to assist in identifying possible locations to potentially dispose of snow. MassDEP encourages municipalities to use this tool to identify possible snow disposal options. The tool identifies wetland resource areas, public drinking water supplies and other sensitive locations where snow should not be disposed. The tool may be accessed through the Internet at the following web address:
https://maps.env.state.ma.us/dep/arcgis/js/templates/PSF/.

2. SITE PREPARATION AND MAINTENANCE

In addition to carefully selecting disposal sites before the winter begins, it is important to prepare and maintain these sites to maximize their effectiveness. The following maintenance measures should be undertaken for all snow disposal sites:

- A silt fence or equivalent barrier should be placed securely on the downgradient side of the snow disposal site.
- Wherever possible maintain a 50-foot vegetated buffer between the disposal site and adjacent waterbodies to filter pollutants from the meltwater.
- Clear debris from the site prior to using the site for snow disposal.
- Clear debris from the site and properly dispose of it at the end of the snow season, and no later than May 15.

3. SNOW DISPOSAL APPROVALS

Proper snow disposal may be undertaken through one of the following approval procedures:

- Routine snow disposal – Minimal, if any, administrative review is required in these cases when upland and pervious snow disposal locations or upland locations on impervious surfaces that have functioning and maintained stormwater management systems have been identified, mapped, and used for snow disposal following ordinary snowfalls. Use of upland and pervious snow disposal sites avoids wetland resource areas and allows snow meltwater to recharge groundwater and will help filter pollutants, sand, and other debris. This process will address the majority of snow removal efforts until an entity exhausts all available upland snow disposal sites. The location and mapping of snow disposal sites will help facilitate each entity's routine snow management efforts.
- Emergency Certifications – If an entity demonstrates that there is no remaining capacity at upland snow disposal locations, local conservation commissions may issue an Emergency Certification under the Massachusetts Wetlands Protection regulations to authorize snow disposal in buffer zones to wetlands, certain open water areas, and certain wetland resource areas (i.e. within flood plains). Emergency Certifications can only be issued at the request of a public agency or by order of a public agency for the protection of the health or safety of citizens, and are limited to those activities necessary to abate the emergency. See 310 CMR 10.06(1)-(4). Use the following guidelines in these emergency situations:
    - Dispose of snow in open water with adequate flow and mixing to prevent ice dams from forming.
    - Do not dispose of snow in salt marshes, vegetated wetlands, certified vernal pools, shellfish beds, mudflats, drinking water reservoirs and their tributaries, Zone IIs or IWPAs of public water supply wells, Outstanding Resource Waters, or Areas of Critical Environmental Concern.
    - Do not dispose of snow where trucks may cause shoreline damage or erosion.
    - Consult with the municipal Conservation Commission to ensure that snow disposal in open water complies with local ordinances and bylaws.

- Severe Weather Emergency Declarations – In the event of a large-scale severe weather event, MassDEP may issue a broader Emergency Declaration under the Wetlands Protection Act which allows federal agencies, state agencies, state authorities, municipalities, and businesses greater flexibility in snow disposal practices. Emergency Declarations typically authorize greater snow disposal options while protecting especially sensitive resources such as public drinking water supplies, vernal pools, land containing shellfish, FEMA designated floodways, coastal dunes, and salt marsh. In the event of severe winter storm emergencies, the snow disposal site maps created by municipalities will enable MassDEP and the Massachusetts Emergency Management Agency (MEMA) in helping communities identify appropriate snow disposal locations.

  If upland disposal sites have been exhausted, the Emergency Declaration issued by MassDEP allows for snow disposal near water bodies. In these situations, a buffer of at least 50 feet, preferably vegetated, should still be maintained between the site and the waterbody. Furthermore, it is essential that the other guidelines for preparing and maintaining snow disposal sites be followed to minimize the threat to adjacent waterbodies.

Under extraordinary conditions, when all land-based snow disposal options are exhausted, the Emergency Declaration issued by MassDEP may allow disposal of snow in certain waterbodies under certain conditions. ***A federal agency, state agency, state authority, municipality or business seeking to dispose of snow in a waterbody should take the following steps***:

- Call the emergency contact phone number [(888) 304-1133)] and notify the MEMA of the municipality's intent.
- MEMA will ask for some information about where the requested disposal will take place.
- MEMA will confirm that the disposal is consistent with MassDEP's Severe Weather Emergency Declaration and these guidelines and is therefore approved.

During declared statewide snow emergency events, MassDEP's website will also highlight the emergency contact phone number [(888) 304-1133)] for authorizations and inquiries. For further non-emergency information about this Guidance you may contact your MassDEP Regional Office Service Center:

Northeast Regional Office, Wilmington, 978-694-3246
Southeast Regional Office, Lakeville, 508-946-2714
Central Regional Office, Worcester, 508-792-7650
Western Regional Office, Springfield, 413-755-2114

Outfall Inventory

The updated Outfall Inventory is available electronically in the Town's record keeping files at the Winchendon Department of Public Works.

Permit Year 5

(July 1, 2022 – June 30, 2023)

Year 5 Annual Report
Massachusetts Small MS4 General Permit
New Permittees
Reporting Period: July 1, 2022-June 30, 2023

Please DO NOT attach any documents to this form. Instead, attach all requested documents to an email when submitting the form. Also ensure any websites included on this form are publicly accessible

Unless otherwise noted, all fields are required to be filled out. If a field is left blank, it will be assumed the requirement or task has not been completed. Please ONLY report on activities between July 1, 2022 and June 30, 2023 unless otherwise requested.

Part I: Contact Information

Name of Municipality or Organization: Town of Winchendon

EPA NPDES Permit Number: MAR041244

Primary MS4 Program Manager Contact Information

Name: Brian Croteau

Title: Director of Public Works & Facilities

Street Address Line 1: Town of Winchendon

Street Address Line 2: 109 Front Street

City: Winchendon

State: MA

Zip Code: 01475

Email: bcroteau@winchendon-ma.gov

Phone Number: (978) 297-0170

Stormwater Management Program (SWMP) Information

SWMP Location (web address): https://www.townofwinchendon.com/public-works/pages/winchendon-stormwater-program

Date SWMP was Last Updated: December 2022

If the SWMP is not available on the web please provide the physical address:

Part II: Self-Assessment

First, in the box below, select the impairment(s) and/or TMDL(s) that are applicable to your MS4.

Impairment(s)

☐ Bacteria/Pathogens ☐ Chloride ☐ Nitrogen ☐ Phosphorus
☐ Solids/ Oil/ Grease (Hydrocarbons)/ Metals

TMDL(s)

In State: ☐ Assabet River Phosphorus ☐ Bacteria and Pathogen ☐ Cape Cod Nitrogen
☐ Charles River Watershed Phosphorus ☒ Lake and Pond Phosphorus

Out of State: ☐ Bacteria/Pathogens ☐ Metals ☒ Nitrogen ☐ Phosphorus

Clear Impairments and TMDLs

Next, check off all requirements below that have been completed. ***By checking each box you are certifying that you have completed that permit requirement fully.*** *If you have not completed a requirement leave the box unchecked. Additional information will be requested in later sections.*

Year 5 Requirements

☒ Completed Phase I of system mapping

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

Annual Requirements

☒ Provided an opportunity for public participation in review and implementation of SWMP and complied with State Public Notice Requirements

☒ Kept records relating to the permit available for 5 years and made available to the public

☒ The SSO inventory has been updated, including the status of mitigation and corrective measures implemented

- ○ This is not applicable because we do not have sanitary sewer
- ◉ This is not applicable because we did not find any new SSOs
- ○ The updated SSO inventory is attached to the email submission
- ○ The updated SSO inventory can be found at the following publicly available website:

☒ Updated the outfall and interconnection inventory and priority ranking as necessary

- ◉ The priority ranking of outfalls/interconnections is attached to the email submission
- ○ The priority ranking of outfalls/interconnections can be found at the following website:

- ☒ Provided training to employees involved in IDDE program within the reporting period
- ☒ Properly stored and disposed of catch basin cleanings and street sweepings so they did not discharge to receiving waters
- ☒ All curbed roadways were swept at least once within the reporting period
- ☒ Enclosed all road salt storage piles or facilities and implemented winter road maintenance procedures to minimize the use of road salt
- ☒ Implemented SWPPPs for all permittee owned or operated maintenance garages, public works yards, transfer stations, and other waste handling facilities
- ☒ Updated inventory of all permittee owned facilities as necessary
- ☒ O&M programs for all permittee owned facilities have been completed and updated as necessary
- ☒ Implemented all maintenance procedures for permittee owned facilities in accordance with O&M programs
- ☒ Implemented program for MS4 infrastructure maintenance to reduce the discharge of pollutants
- ☐ Inspected all permittee owned treatment structures (excluding catch basins)

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

As a new permittee, mapping of structural BMPs and stormwater treatment structures was completed in Permit Year 5 as part of the Phase I system mapping. Starting in Permit Year 6, the Town will track this information and begin to inspect Town-owned BMPs in the MS4.

Nitrogen (Combination of Impaired Waters Requirements and TMDL Requirements as Applicable)

<u>Annual Requirements</u>

*Public Education and Outreach**

- ☒ Distributed an annual message in the spring (April/May) that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release fertilizers
- ☒ Distributed an annual message in the summer (June/July) encouraging the proper management of pet waste, including noting any existing ordinances where appropriate
- ☒ Distributed an annual message in the fall (August/September/October) encouraging the proper disposal of leaf litter

** Public education messages can be combined with other public education requirements as applicable (see Appendix H and F for more information)*

Good Housekeeping and Pollution Prevention for Permittee Owned Operations

- ☒ Increased street sweeping frequency of all municipal owned streets and parking lots subject to Permit part 2.3.7.a.iii.(c) to a minimum of two times per year (spring and fall)

Potential structural BMPs

☒ Any structural BMPs listed in Table 3 of Attachment 1 to Appendix F already existing or installed in the regulated area by the permittee or its agents was tracked and the nitrogen removal by the BMP was estimated consistent with Attachment 1 to Appendix F. The BMP type, total area treated by the BMP, the design storage volume of the BMP and the estimated nitrogen removed in mass per year by the BMP were documented.

- ○ No BMPs were installed
- ◉ The BMP information is attached to the email submission
- ○ The BMP information can be found at the following website:

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

Nitrogen removal estimates for a new BMP installed at the Winchendon Community Park are attached. In the Permit term, three additional stormwater basins have been installed in Town, two of which are located outside of the urbanized area, and are not subject to nitrogen removal calculations. The third was installed by DPW staff, however stormwater design plans and reports were not prepared as part of the installation. As a result, the nitrogen removal cannot be determined. Other stormwater basins and grassed channels added to the GIS as part of Phase I mapping efforts do not have design plans or stormwater reports available, so nitrogen removal can not be determined.

The Town has developed an initial draft of the Nitrogen Source Identification Report for the Miller's River Watershed (Long Island Sound TMDL), which will be finalized in advance of the EPA deadline for new permittees.

Lake and Pond Phosphorus TMDL

☐ Completed the written Lake Phosphorus Control Plan (LPCP), including: *(select the items in the LPCP that have been completed)*

- ☐ Planned nonstructural controls
- ☐ Planned structural controls
- ☐ O&M program for structural controls
- ☐ Implementation schedule
- ☐ Cost of implementation

The LPCP: (*select one of the following options)*

- ◉ is attached to the email submission
- ○ can be found at the following publicly available website:

Below, calculate your current phosphorus export rate by first filling out the individual phosphorus loading components (labeled [A], [B], [C], and [D]) and then computing your current phosphorus export rate using the equation provided.

Baseline phosphorus export reduction required from LPCP Area **(lbs/year) [A]**:

☐ Documented the nonstructural control measures implemented during **this reporting period** and their phosphorus reduction

total phosphorus reduction from all nonstructural controls this reporting period **(lbs/year) [B]**:

○ No nonstructural control measures were implemented

○ The nonstructural control measures information is attached to the email submission

○ The nonstructural control measures information can be found at the following publicly available website:

☐ Documented the structural control measures implemented during **this reporting period and all previous years**, including location, phosphorus reduction in weight/year, and date of last completed maintenance and inspection for each control

total phosphorus reduction from all structural controls installed this reporting period and all previous years **(lbs/year) [C]**:

○ No structural control measures were implemented

○ The structural control measures information is attached to the email submission

○ The structural control measures information can be found at the following publicly available website:

Phosphorus load increase due to development incurred since baseline loading was calculated in **lbs/year [D]**:

Current phosphorus export rate from the LPCP Area in **lbs/year [=A-(B+C)+D from above]**:

☐ I certify under penalty of law that all source control and treatment Best Management Practices being claimed for phosphorus reduction credit have been inspected, maintained and repaired in accordance with manufacturer or design specification. I certify that, to the best of my knowledge, all Best Management Practices being claimed for a phosphorus reduction credit are performing as originally designed.

☐ All municipally owned and maintained turf grass areas are being managed in accordance with Massachusetts Regulation 331 CMR 31.00 pertaining to proper use of fertilizers on turf grasses

Optional: If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

To date, the Town has completed components 1-4 of the LPCP: Legal Analysis, Funding Source Assessment, LPCP Scope/Area, and Phosphorus Loadings. The current LPCP is attached with this submittal. The schedule for completing the LPCP for new permittees is extended by two years. The information and certifications requested here will be completed by Permit Year 7 in accordance with Section 1.10.3 of the General Permit.

Optional: Use the box below to provide any additional information you would like to share as part of your self-assessment:

Part III: Receiving Waters/Impaired Waters/TMDL

Have you made any changes to your lists of receiving waters, outfalls, or impairments since the NOI was submitted? Make sure you are referring to the most recent EPA approved Section 303(d) Impaired Waters List which can be found here: https://www.epa.gov/tmdl/region-1-impaired-waters-and-303d-lists-state

- (●) Yes
- ( ) No

If yes, describe below, including any relevant impairments or TMDLs:

Winchendon's NOI listed potential receiving waters based on the water quality limited waters within the Town's urbanized area based on the 2014 303(d) List. In Permit Year 2, the Town included as part of the Annual Report a summary of potential impairments and receiving waters based on the 2016 303(d) List. In Permit Year 3, the Town included as part of the Annual Report a summary of field work completed to refine the outfall inventory, receiving waters, and applicable impairments. In Permit Year 4, the Town analyzed changes to impairments and/or receiving waters based on the 2018/2020 303(d) List as part of the Annual Report submission. These evaluations are located in the Town's SWMP.

The Town has evaluated changes to the impairments and/or receiving waters based on the final 2022 303(d) List. The analysis is submitted as an attachment with this Annual Report. There are no other changes to the Town's receiving waters and associated impairments based on the final 2022 303(d) List. Winchendon is not subject to any impairments listed in Appendix H and there have been no changes to the TMDLs.

As part of drainage system mapping improvements completed in Permit Year 5, the Town refined outfall locations and completed some dry weather screening efforts (see MCM 3). As part of data review, it was determined that the outfall inventory submitted with the Permit Year 4 annual report included incorrect outfall IDs. This has been corrected in the attached inventory.

Part IV: Minimum Control Measures

Please fill out all of the metrics below. If applicable, include in the description who completed the task if completed by a third party.

MCM1: Public Education

Number of educational messages completed **during this reporting period**: 4

*Below, report on the educational messages completed **during this reporting period**. For the measurable goal(s) please describe the method/measures used to assess the overall effectiveness of the educational program.*

BMP: Education and Outreach to Residents and Businesses (Multi-media Methods)

Message Description and Distribution Method:

The Town provides educational MS4 permit information to the general public on their Stormwater Program webpage. The webpage includes an overview of the NPDES Stormwater Program, educational flyers, and materials regarding stormwater pollution impacts, and a link to the Town's SWMP.

Targeted Audience: Residents and Businesses, institutions and commercial facilities

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

The educational messages and materials are available to all visitors of the Town's Stormwater Program website.

Message Date(s): Ongoing

Message Completed for: Appendix F Requirements ☒ Appendix H Requirements ☐

Was this message different than what was proposed in your NOI? Yes ○ No ●

If yes, describe why the change was made:

BMP: Education and Outreach to Residents and Businesses (Multi-media Methods)

Message Description and Distribution Method:

The Town's MS4 Public Education webpage includes multiple educational materials and brochures for the general public to access:

An educational brochure titled "Be a Lawn Hero"discusses the issues with excess fertilizer in lawns and explains proper grass clipping disposal in order to prevent clippings from entering stormwater infrastructure and wetlands.

A second brochure titled "Don't Trash the Grass" provides proper housekeeping tips for lawn care. Discussions include using grass clipping as fertilizer, proper fertilizer usage, mowing, and water practices.

"Use Lawn Chemicals Wisely" provides information about lawn chemicals and issues with fertilizer use. Action items can be taken to lessen the effect lawn chemicals have on water quality are also discussed. The brochure includes information on how stormwater runoff can impact a Town's watershed.

A Think Blue Massachusetts education flyer includes information on the effect of fertilizer on water bodies and how excess fertilizer can harm natural vegetation and animals.

Targeted Audience: Residents and Businesses, institutions and commercial facilities

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

The educational messages and materials are available to all visitors of the Town's Stormwater Program website.

Message Date(s): Ongoing

Message Completed for: Appendix F Requirements ☒ Appendix H Requirements ☐

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

BMP: Education and Outreach to Residents (Brochure with Dog Licenses)

Message Description and Distribution Method:

Educational brochures are provided to residents when dog licenses are issued or renewed. The brochure discusses the proper management of pet waste.

Targeted Audience: Residents

Responsible Department/Parties: Department of Public Works

Measurable Goal(s):

1,700 dog licenses were issued to residents in Permit Year 5.

Message Date(s): January - March 2023

Message Completed for: Appendix F Requirements ☒ Appendix H Requirements ☐

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

BMP: Education and Outreach to Residents (Multi-media Methods)

Message Description and Distribution Method:

The Town shared multiple messages regarding educational stormwater notices throughout Permit Year 5 on their Facebook page. Stormwater topics and outreach items included a message sharing lawn care information with an informative flier and a link to the Town website.

Targeted Audience: All audiences

Responsible Department/Parties: Town of Winchendon

Measurable Goal(s):

The information was shared on the Town's Facebook page, which has approximately 3,700 Facebook followers.

The Lawn care educational message posted on the Town's Facebook page received three likes and three shares. The Earth Day town-wide cleanup outreach message posted on the Town's Facebook page recieved five likes and eight shares.

Message Date(s): April 26, 2023
May 16, 2023

Message Completed for: Appendix F Requirements ☒ Appendix H Requirements ☐

Was this message different than what was proposed in your NOI? Yes ○ No ◉

If yes, describe why the change was made:

Add an Educational Message

MCM2: Public Participation

Describe the opportunity provided for public involvement in the development of the Stormwater Management Program (SWMP) **during this reporting period**:

The Stormwater Management Plan (SWMP) is available on the Town's website for the public to review and comment.

Was this opportunity different than what was proposed in your NOI? Yes ○ No ◉

Describe any other public involvement or participation opportunities conducted **during this reporting period**:

The Town utilizes an SSO public notification subscription service where residents can be informed of any SSO events that occur requiring documentation under 314 CMR 16.00.

Household hazardous waste, including antifreeze and waste oil, can be disposed of at the transfer station April through October by residents. Additionally, street cleanups and general waste from residents can be disposed of at the transfer station.

On May 6, 2023 the Town's Board of Health hosted a Town cleanup event for Earth Day. The Board of Health provided gloves, trash bags, and the dumpster for trash disposal collected by volunteers.

MCM3: Illicit Discharge Detection and Elimination (IDDE)

Sanitary Sewer Overflows (SSOs)

Check off the box below if the statement is true.

☐ This SSO section is NOT applicable because we DO NOT have sanitary sewer

Below, report on the number of SSOs identified in the MS4 system and removed ***during this reporting period****.*

Number of SSOs identified: 0

Number of SSOs removed: 0

Below, report on the total number of SSOs identified in the MS4 system and removed to date. At a minimum, report SSOs identified ***since the effective date of the permit (July 1, 2018)****.*

Total number of SSOs identified: 1

Total number of SSOs removed: 1

MS4 System Mapping

Below, check all that apply.

The following elements of the Phase I map have been completed:

☒ Outfalls and receiving waters

☒ Open channel conveyances

☒ Interconnections

☒ Municipally-owned stormwater treatment structures

☒ Waterbodies identified by name and indication of all use impairments

☒ Initial catchment delineations

Optional: Describe any additional progress you made on your map during this reporting period or provide additional status information regarding your map:

Municipal stormwater GIS mapping was improved upon in Permit Year 5 in compliance with the mapping requirements of the 2016 Small MS4 General Permit. Efforts included both desktop exercises and field work to locate and identify unmapped drainage infrastructure. See the attached summary memorandum for more information.

The Town has obtained a MassDEP Stormwater Asset Management grant for FY2024. Field work to continue to refine the Town's stormwater GIS mapping is included as part of the grant.

Screening of Outfalls/Interconnections

If conducted, please submit any outfall monitoring results from this reporting period. Outfall monitoring results should include the date, outfall/interconnection identifier, location, weather conditions at time of sampling, precipitation in previous 48 hours, field screening parameter results, and results from all analyses. Please also include the updated inventory and ranking of outfalls/interconnections based on monitoring results.

- (●) No outfalls were inspected
- (●) The outfall screening data is attached to the email submission
- ( ) The outfall screening data can be found at the following website:

*Below, report on the number of outfalls/interconnections screened **during this reporting period**.*

Number of outfalls screened: 10

*Below, report on the percent of outfalls/interconnections screened **to date**.*

Percent of outfalls screened: 47

Optional: Provide additional information regarding your outfall/interconnection screening:

As part of the mapping requirements, the Town refined the stormwater GIS and field verified potential outfall locations. In April 2023, two days of fieldwork were conducted to refine mapping across Town. 15 additional outfalls were investigated and 10 were inventoried and screened for dry weather flow. The remaining 5 outfalls had dry weather flow present but a sampling effort was not completed. Water quality screening data is not included in the attached outfall investigation data. Efforts to continue to locate, screen, and sample remaining outfalls will be conducted in Permit Year 6 as part of the Stormwater Asset Management Grant. Note that the percent of outfalls screened will change as the GIS mapping and outfall inventory are refined. Note that the selection for "No outfalls were inspected" is N/A and cannot be unchecked.

Catchment Investigations

*If conducted, please submit all data collected **during this reporting period** as part of the dry and wet weather investigations. Also include the presence or absence of System Vulnerability Factors for each catchment.*

- (●) No catchment investigations were conducted
- ( ) The catchment investigation data is attached to the email submission
- ( ) The catchment investigation data can be found at the following website:

*Below, report on the number of catchment investigations completed **during this reporting period**.*

Number of catchment investigations completed this reporting period: 0

*Below, report on the percent of catchments investigated **to date**.*

Percent of total catchments investigated: 0

Optional: Provide any additional information for clarity regarding the catchment investigations below:

Catchment investigations will be completed in accordance with the General Permit schedule for new permittees. The Stormwater Asset Management grant will include catchment investigations field work, and data collected will be submitted with the Permit Year 6 annual report.

IDDE Progress

If illicit discharges were found, please submit a document describing work conducted over this reporting period, and cumulative to date, including location source; description of the discharge; method of discovery; date of discovery; and date of elimination, mitigation, or enforcement OR planned corrective measures and schedule of removal.

- (●) No illicit discharges were found
- ( ) The illicit discharge removal report is attached to the email submission
- ( ) The illicit discharge removal report can be found at the following website:

Below, report on the number of illicit discharges identified and removed, along with the volume of sewage removed ***during this reporting period****.*

Number of illicit discharges identified: 0

Number of illicit discharges removed: 0

Estimated volume of sewage removed: 0 gallons/day

Below, report on the total number of illicit discharges identified and removed to date. At a minimum, report on the number of illicit discharges identified and removed ***since the effective date of the permit (July 1, 2018)****.*

Total number of illicit discharges identified: 0

Total number of illicit discharges removed: 0

Optional: Provide any additional information for clarity regarding illicit discharges identified, removed, or planned to be removed below:

Employee Training

Describe the frequency and type of employee training conducted **during this reporting period**:

On March 7, 2023 eight DPW employees attended a one hour MS4 Municipal Good Housekeeping & Pollution Prevention Overview Training. This training covered the following subjects: MS4 program overview, identifying and reporting illicit discharges to the drainage system, and good housekeeping requirements, O&M program.

MCM4: Construction Site Stormwater Runoff Control

Below, report on the construction site plan reviews, inspections, and enforcement actions completed ***during this reporting period****.*

Number of site plan reviews completed: 4

Number of inspections completed: 30

Number of enforcement actions taken: 0

Optional: Enter any additional information relevant to construction site plan reviews, inspections, and enforcement actions:

MCM5: Post-Construction Stormwater Management in New Development and Redevelopment

Ordinance or Regulatory Mechanism

Date ordinance was completed (due in year 3): Bylaw May 2021, Regulations November 2021

Website of ordinance or regulatory mechanism: https://www.townofwinchendon.com/home/pages/town-bylaws https://www.townofwinchendon.com/planning-board/pages/regulations-bylaws

As-built Drawings

Below, report on the number of as-built drawings received ***during this reporting period****.*

Number of as-built drawings received: 0

Optional: Enter any additional information relevant to the submission of as-built drawings:

Street Design and Parking Lots Report

Describe the status of the street design and parking lots assessment including any planned or completed changes to local regulations and guidelines:

An assessment of the Town's local code in terms of street design and parking lot guidelines and green infrastructure was completed in Permit Year 4 using the Mass Audubon "Bylaw Review for LID & ClimateSmart, Nature Based Solutions" tool. A summary of recommended code updates was finalized in Permit Year 5, including suggested modifications to Zoning (2026), Subdivision Rules and Regulations (2025), and Site Plan Review Rules and Regulations (2025). The Town will discuss and refine the recommended street design and parking areas code updates in Permit Year 6, and work towards implementation of proposed revisions and recommended actions.

Green Infrastructure Report

Describe the status of the green infrastructure report including the findings and progress towards making the practice allowable:

An assessment of the Town's local code in terms of street design and parking lot guidelines and green infrastructure was completed in Permit Year 4 using the Mass Audubon "Bylaw Review for LID & ClimateSmart, Nature Based Solutions" tool. A summary of recommended code updates was finalized in Permit Year 5, including suggested modifications to Zoning (2026), Subdivision Rules and Regulations (2025), and Site Plan Review Rules and Regulations (2025). The Town will discuss and refine the recommended green infrastructure and efficient development code updates in Permit Year 6, and work towards the implementation of proposed revisions and recommended actions.

Retrofit Properties Inventory

Describe the status of the inventory of permittee-owned properties that could be modified or retrofitted with BMPs to mitigate impervious areas and report on any properties that have been modified or retrofitted:

In Permit Year 5, an initial assessment was completed for Town-owned properties to determine potential BMP retrofit opportunities in order to mitigate impervious areas and treat site runoff. Five Town-owned properties were identified: Winchendon Fire Department, Toy Town Elementary School, "Clyde the Rocking Horse" Historical Landmark, Old Murdock Senior Center, and the North Central Pathway Rail Trail off Spring Street. This initial assessment is subject to change as the Town continues to review and identify additional sites or infrastructure that could be retrofitted.

In Permit Year 5, a new infiltration basin was installed at the Winchendon Community Park, which treats site runoff prior to discharging directly to Whitney Pond.

MCM6: Good Housekeeping

Catch Basin Cleaning

*Below, report on the number of catch basins inspected and cleaned, along with the total volume of material removed from the catch basins **during this reporting period**.*

Number of catch basins inspected: 520

Number of catch basins cleaned: 520

Total volume or weight of material removed from all catch basins: 320 cubic yards

Below, report on the total number of catch basins in the MS4 system, if known.

Total number of catch basins: 707

If applicable:

Report on the actions taken if a catch basin sump is more than 50% full during two consecutive routine inspections/cleaning events:

Street Sweeping

Report on street sweeping completed ***during this reporting period*** *using one of the three metrics below.*

- (●) Number of miles cleaned: 170
- ( ) Volume of material removed: [Select Units]
- ( ) Weight of material removed: [Select Units]

Stormwater Pollution Prevention Plan (SWPPP)

Below, report on the number of site inspections for facilities that require a SWPPP completed ***during this reporting period****.*

Number of site inspections completed:

Describe any corrective actions taken at a facility with a SWPPP:

There are no applicable facilities within the Town's urbanized area that require a SWPPP.

Additional Information

Monitoring or Study Results

Results from any other stormwater or receiving water quality monitoring or studies conducted during the reporting period not otherwise mentioned above, where the data is being used to inform permit compliance or permit effectiveness must be attached.

- (●) Not applicable
- ( ) The results from additional reports or studies are attached to the email submission
- ( ) The results from additional reports or studies can be found at the following website(s):

If such monitoring or studies were conducted on your behalf or if monitoring or studies conducted by other entities were reported to you, a brief description of the type of information gathered or received shall be described below:

Additional Information

Optional: Enter any additional information relevant to your stormwater management program implementation during the reporting period. Include any BMP modifications made by the MS4 if not already discussed above. If any of the above year 5 requirements could not be completed due to the impacts of COVID-19, please identify the requirement that could not be completed, any actions taken to attempt to complete the requirement, and reason the requirement could not be completed below:

Activities Planned for Next Reporting Period

Please confirm that your SWMP has been, or will be, updated to comply with all applicable permit requirements including but not limited to the year 6 requirements summarized below. (Note: impaired waters and TMDL requirements are not listed below)

Yes, I agree ☒

- Develop a report assessing current street design and parking lot guidelines and other local requirements within the municipality that affect the creation of impervious cover
- Develop a report assessing existing local regulations to determine the feasibility of making green infrastructure practices allowable when appropriate site conditions exist
- Identify a minimum of 5 permittee-owned properties that could potentially be modified or retrofitted with BMPs to reduce impervious areas

Annual Requirements

- Annual report submitted and available to the public
- Annual opportunity for public participation in review and implementation of SWMP
- Keep records relating to the permit available for 5 years and make available to the public
- Properly store and dispose of catch basin cleanings and street sweepings so they do not discharge to receiving waters
- Continue public education and outreach program
- Update inventory of all known locations where SSOs have discharged to the MS4
- Sweep all curbed roadways at least once within the reporting period
- Annual training to employees involved in IDDE program
- Clean catch basins in accordance with catch basin cleaning procedures to ensure that no catch basin is greater than 50% full
- Review site plans of construction sites as part of the construction stormwater runoff control program
- Conduct site inspections of construction sites as necessary
- Inspect and maintain stormwater treatment structures
- Log catch basins cleaned or inspected
- Sweep all curbed streets at least annually
- Implement SWPPPs for all permittee owned or operated maintenance garages, public works yards, transfer stations, and other waste handling facilities
- Review inventory of all permittee owned facilities in the categories of parks and open space,

buildings and facilities, and vehicles and equipment; update if necessary
- Review O&M programs for all permittee owned facilities; update if necessary
- Implement all maintenance procedures for permittee owned facilities in accordance with O&M programs
- Enclose all road salt storage piles or facilities and implement winter road maintenance procedures to minimize the use of road salt
- Review as-built drawings for new and redevelopment to ensure compliance with post construction bylaws, regulations, or regulatory mechanism consistent with permit requirements

Provide any additional details on activities planned for permit year 6 below:

The Town acknowledges the General Permit Year 6 requirements and will complete as many activities as possible to the maximum extent feasible based on staff availability and funding.

Part VI: Certification of Small MS4 Annual Report 2023

<u>40 CFR 144.32(d) Certification</u>

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: Brian Croteau

Title: Director of Pub. Works & Facilities

Signature: [signature]

[Signatory may be a duly authorized representative]

Date: 9.26.23

Summary of Winchendon's TMDLs and Impaired Waters [1]

Receiving Waterbody	2018/2020 Category	2018/2020 Water Quality Impairments	2022 Category[2]	2022 Water Quality Impairments[2]	Applicable General Permit Section	Changes to Permit Requirements
Whitney Pond MA35101	5	Aquatic Plants (Macrophytes) Mercury in Fish Tissue Turbidity (TMDL 4145)	5	Aquatic Plants (Macrophytes)* Mercury in Fish Tissue Turbidity (TMDL 4145)	Appendix F, Section A.II Lake and Pond Phosphorus TMDL	None
Millers River MA35-01	5	Ambient Bioassays - Chronic Aquatic Toxicity Lack of a coldwater assemblage Temperature	5	Ambient Bioassays - Chronic Aquatic Toxicity Fish Bioassessments Lack of a coldwater assemblage Temperature		None
North Branch Millers River MA35-21	5	Mercury in Fish Tissue	5	Mercury in Fish Tissue		None
Millers River MA35-02[3]	5	PCBs in Fish Tissue	5	Curly-leaf Pondweed* Fish Bioassessments PCBs in Fish Tissue		None
Millers River MA35-03[3]	5	PCBs in Fish Tissue	5	Fish Bioassessments PCBs in Fish Tissue		None
Otter River MA35-08[3]	5	PCBs in Fish Tissue	5	Curly-leaf Pondweed* Escherichia Coli (E. Coli) PCBs in Fish Tissue	See footnote 3	None
Priest Brook MA35-10[3]	2		2			None
Lake Denison MA35017[3]	4a	Dissolved Oxygen (TMDL 4123) Mercury in Fish Tissue (TMDL 33880)	5	Dissolved Oxygen (TMDL 4123) Enterococcus Mercury in Fish Tissue (TMDL 33880)	Appendix F, Section A.II Lake and Pond Phosphorus TMDL See footnote 3	None
Whites Mill Pond MA35099[3]	4a	Aquatic Plants (Macrophytes) Nutrient/Eutrophication Biological Indicators (TMDL 4144)	4a	Aquatic Plants (Macrophytes)* Nutrient/Eutrophication Biological Indicators (TMDL 4144)	Appendix F, Section A.II Lake and Pond Phosphorus TMDL See footnote 3	None
Lake Monomonac MA35047[3]	5	Non-Native Aquatic Plants Mercury in Fish Tissue	5	Non-Native Aquatic Plants* Mercury in Fish Tissue	Appendix F, Section A.II Lake and Pond Phosphorus TMDL See footnote 3	None
Millers River MA35-20[3]	5	Lack of a coldwater assemblage Temperature	5	Benthic Macroinvertebrates Fish Bioassessments Lack of a coldwater assemblage Lead Temperature	See footnote 3	None
Sunset Lake MA35086[3]	3		3			None
Stoddard Pond MA35083[3]	4c	Aquatic Plants (Macrophytes)	4c	Aquatic Plants (Macrophytes)*	Appendix F, Section A.II Lake and Pond Phosphorus TMDL	None
Long Island Sound Nitrogen TMDL					Appendix F, Section B.I Nitrogen TMDL	None
Lakes and Ponds Phosphorus TMDL for Selected Millers Basin Lakes					Appendix F, Section A.II Lake and Pond Phosphorus TMDL	None

[1] Any TMDL or impairments related to nutrients (nitrogen and phosphorus) apply to all tributaries and the watershed. For example, Millers River ultimately joins the Connecticut River and is subject to the Lond Island Sound Nitrogen TMDL. All of Winchendon is in the Millers River watershed.
[2] Impairments and categories in blue were added and modified since the previous Integrated List of Waters was updated in 2022.
[3] Waterbody is outside of Winchendon's MS4 or does not receive direct discharge from the MS4. Included for reference only.
*TMDL not required (Non-pollutant)

Lake Phosphorus Control Plan (LPCP) for Winchendon's Lakes and Ponds in Millers River Basin Legal Analysis

The LPCP Legal Analysis is located in Appendix I of this SWMP

The **Phase I Mapping Field Effort Summary** memorandum is available in the Town's IDDE Program record keeping files at the Department of Public Works.

Winchendon BMP Nutrient
Removal Estimate Calculations

BMP Location	Type	Infiltration Rate/ Rawls Rate (in/hr)[a]	BMP Storage Volume (ft^3)[b]	Catchment Areas					Soil Type	Hydrologic Soil Group[c]	BATT Phosphorus Removed (lbs/yr)	BATT Nitrogen Removed (lbs/yr)
				Pervious Open Space (Woods, Good) (acres)	Pervious Open Space (>75% Grass Cover, Good) (acres)	Impervious Area Open Space, Proposed (acres)	Impervious Area Open Space, Existing (acres)	Total Area (acres)				
Winchendon Community Park Performing Arts Center 86 Ingleside Road	Infiltration Basin	0.27	4,068	0.83	0.55	0.41	0.05	1.84	351C: Becket fine sandy loam	C	**0.9**	**8.3**

Notes:

a. Infiltration Rate used is from Stormwater Management Report, Attachment 5 of designed stormwater system.

b. BMP storage volume is from HydroCAD report of designed stormwater system.

c. Hydrologic Soil Group used is from HydroCAD report of designed stormwater system.

Permit Year 6

(July 1, 2023 – June 30, 2024)

Appendix I

TMDL Reporting and Evaluations

Lake Phosphorus Control Plan (LPCP) for Winchendon's Lakes and Ponds in Millers River Basin

TO: Town of Winchendon

FROM: Emily Scerbo, PE, Senior Project Manager
Cassandra LaRochelle, PE, Project Manager

DATE: June 30, 2022

Tighe & Bond is providing this memorandum to the Town of Winchendon to document requirements of the U.S. Environmental Protection Agency's (EPA's) *General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems* (MS4GP) related to discharges to Whitney Pond, White's Mill Pond, Stoddard Pond, and Lake Dennison and their tributaries (see Part 2.2 and Appendix F of the MS4GP). This memorandum presents information regarding the lakes and ponds within the Millers River Watershed affected by the MS4GP as well as the phased requirements for a Lake Phosphorus Control Plan (LPCP).

1.0 Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

Phosphorus is a nutrient that, when present at high levels in natural waterbodies, can cause overgrowth of aquatic plants, increased harmful algal blooms, decreased light in a waterbody, and decreased levels of dissolved oxygen, thereby impairing designated uses (aquatic life, fish consumption, primary and secondary contact, and aesthetics) per the Commonwealth's Surface Water Quality Standards (314 CMR 4.00). Phosphorus is a common pollutant in stormwater, with sources including leaf litter, pet waste, road salt, fertilizer, and atmospheric deposition. A variety of structural (infiltration and treatment structures) and non-structural (such as street sweeping and catch basin cleaning) best management practices (BMPs) can be effective at reducing phosphorus loads from stormwater.

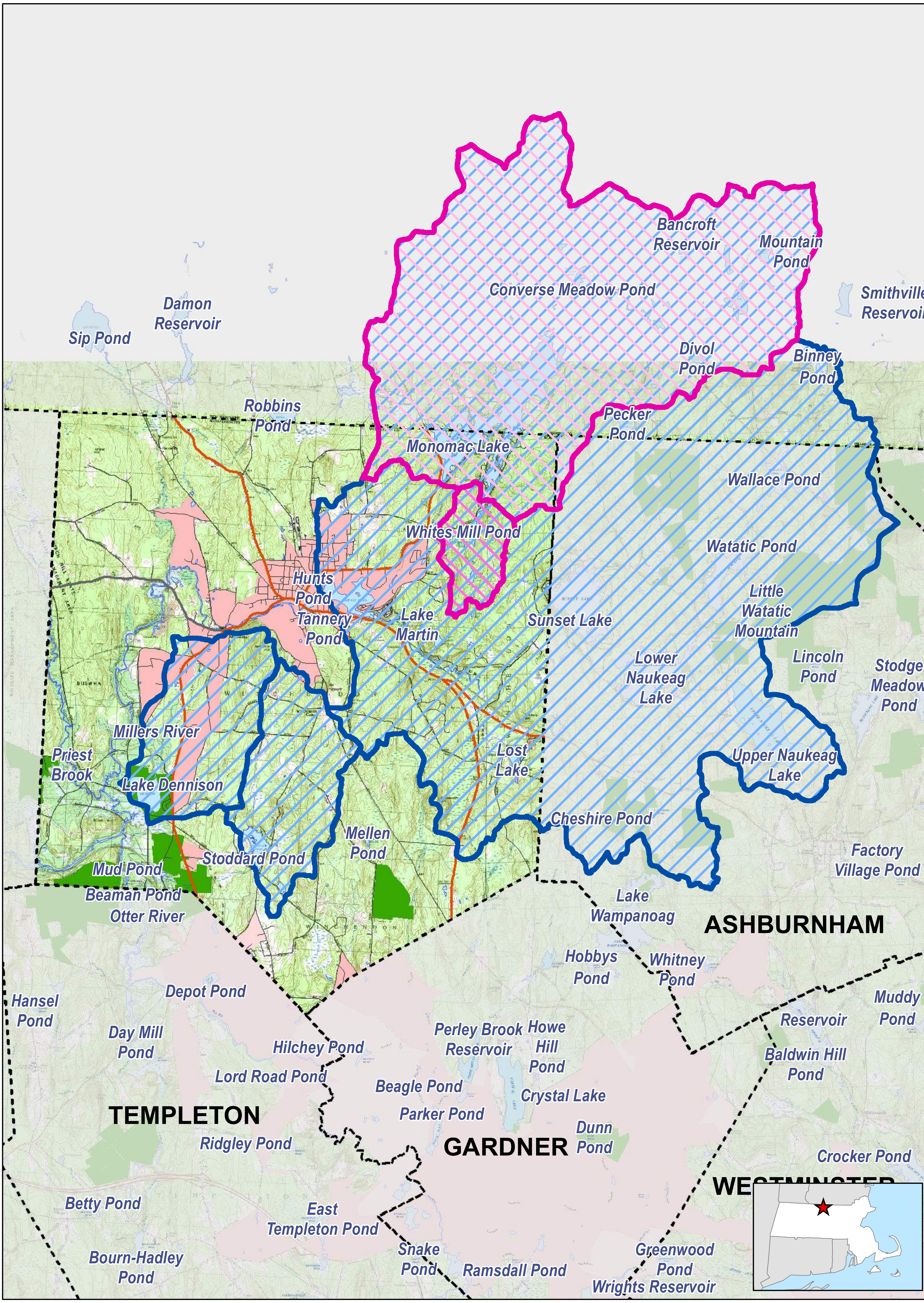
A Total Maximum Daily Load (TMDL) (a.k.a. "pollution budget") for phosphorus was developed and approved in 2003 for select waterbodies (lakes and ponds) in the Millers River watershed, including Whitney Pond, White's Mill Pond, Stoddard Pond, Lake Dennison, and Lake Monomonac[1].

The final 2018/2020 Integrated List of Waters lists the following impairments for these lakes and ponds:

- **Whitney Pond** (MA35101) - Aquatic Plants (Macrophytes), Mercury in Fish Tissue, and Turbidity
- **White's Mill Pond** (MA35099) – Aquatic Plants (Macrophytes) and Nutrient/ Eutrophication Biological Indicators
- **Stoddard Pond** (MA35083) – Aquatic Plants (Macrophytes)
- **Lake Dennison** (MA35017) - Dissolved Oxygen and Mercury in Fish Tissue
- **Lake Monomonac** (MA35047) – Non-Native Aquatic Plants and Mercury in Fish Tissue

Excerpts from the 2018/2020 Integrated List of Waters are enclosed. An overview map of these lakes and ponds and their watersheds is included in **Figure 1** below.

[1] Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes (TMDL Report Number: MA35005-2002-1), URL: https://www.mass.gov/doc/final-tmdls-of-phosphorus-for-selected-millers-river-basin-lakes/download



Limited Access Highway
Multi-Lane Highway, NOT Limited Access
Other Numbered Highway
Major Road - Collector
Minor Street or Road

Subject only to Millers River TMDL
Subject to LPCP and Millers River TMDL
MS4 Regulated Urban Area (2000 Census)
MS4 Regulated Urban Area (2010 Census)

Department of Conservation and Recreation, Division of State Parks and Recreation
Public Surface Water Supply (PSWS)
Water Bodies
Town Boundary

1:75,000

0 3,125 6,250

Feet

N

Tighe&Bond

1. Based on MassGIS Color Orthophotography (2021)

LAKE AND PHOSPHORUS CONTROL PLAN OVERVIEW

Winchendon, Massachusetts

June 2022

G:\GIS\MA\WinchendonMA\avproj\11x17_PhosControlPlan_2022.mxd [Exported By: LFrassinelli, 7/18/2022, 8:33:24 AM]

W-1157

Note that the watersheds for Lake Monomonac, White's Mill Pond, and their tributaries are located outside of Winchendon's MS4 area, and therefore are not subject to the LPCP requirements of the MS4GP. However, the TMDL still applies. The Town may elect to implement the requirements of the LPCP within these watersheds as budget allows. We recommend that any future local code improvements apply to the entire Town and not be limited to the MS4 urbanized area.

Following is an overview of these waterbodies' watershed characteristics. Watershed-Based Plans for these lakes and ponds are enclosed, which were prepared using the Massachusetts Watershed-Based Plan toolkit and provide additional background information about the watershed and water quality concerns.

1.1 Overview of Whitney Pond's Watershed

Whitney Pond occupies approximately 97 acres in Winchendon. The pond is located south of Route 202, west of Glenallen Street, and north of Spring Street. The pond is fed by Millers River and North Branch Millers River from the east and is formed by a 21-foot-high dam. The watershed of Whitney Pond is approximately 52.2 square miles in both MA and NH, and 30.6 square miles within MA alone. Land use within the pond's watershed includes residential (6.2%) and agricultural (1.8%), both of which may contribute to phosphorus levels in the pond. The Watershed-Based Plan indicates that water samples collected in 2001 identify high color values, low pH, low alkalinity, and low dissolved oxygen in Whitney Pond. These values indicate that Whitney Pond water quality is highly influenced by wetland drainage. However, there is not enough data to definitively prove that these anoxic, high phosphorus conditions are not naturally occurring.

Figure 2, below, shows the location of Whitney Pond and the approximate watershed using the Massachusetts Watershed-Based Plan toolkit, available online at:
http://prj.geosyntec.com/MassDEPWBP/PlanWizard/SelectWatershed

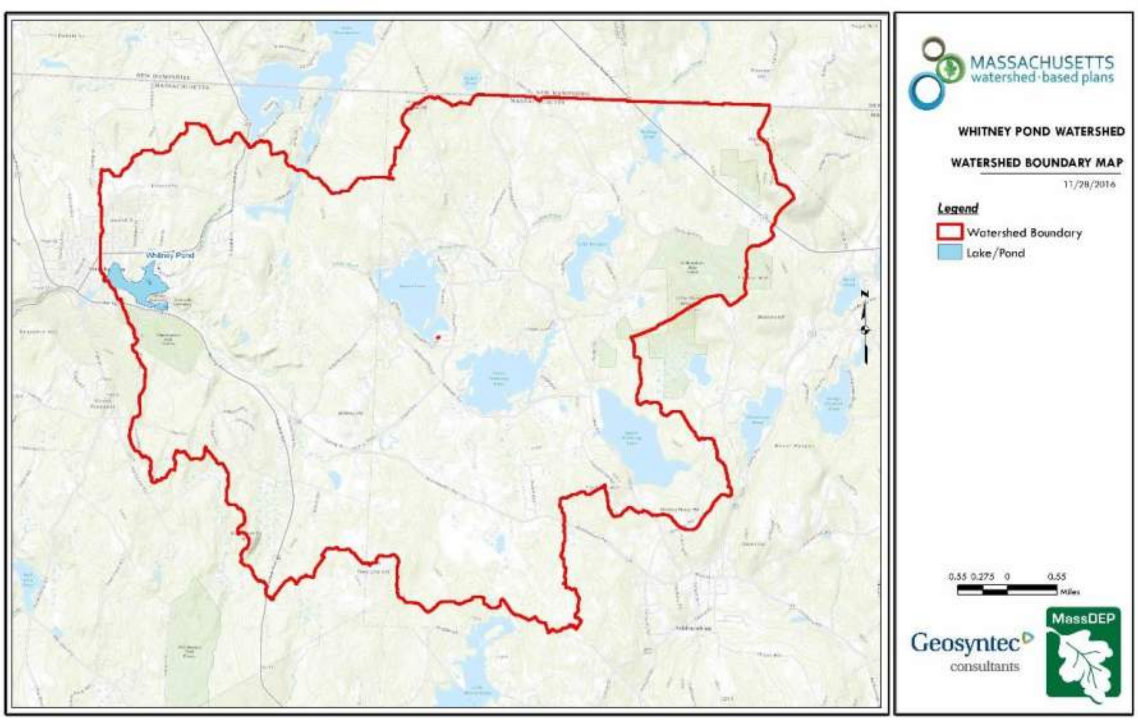


FIGURE 2: Whitney Pond Watershed

1.2 Overview of Stoddard Pond's Watershed

Stoddard Pond occupies approximately 52 acres in Winchendon. The pond is located north of Mill Glen Road and west of Baldwinville Road. The pond is fed by Beaman Brook from the north and the outlet is controlled by an 8-foot dam. The total watershed of Stoddard Pond is approximately 3.2 square miles. Land use within the pond's watershed includes 9.1% low density residential and 5.3% agricultural. Like Whitney Pond, Stoddard Pond is characterized by anoxic, high phosphorus conditions.

Figure 3, below, shows the location of Stoddard Pond and the approximate watershed using the Massachusetts Watershed-Based Plan toolkit.

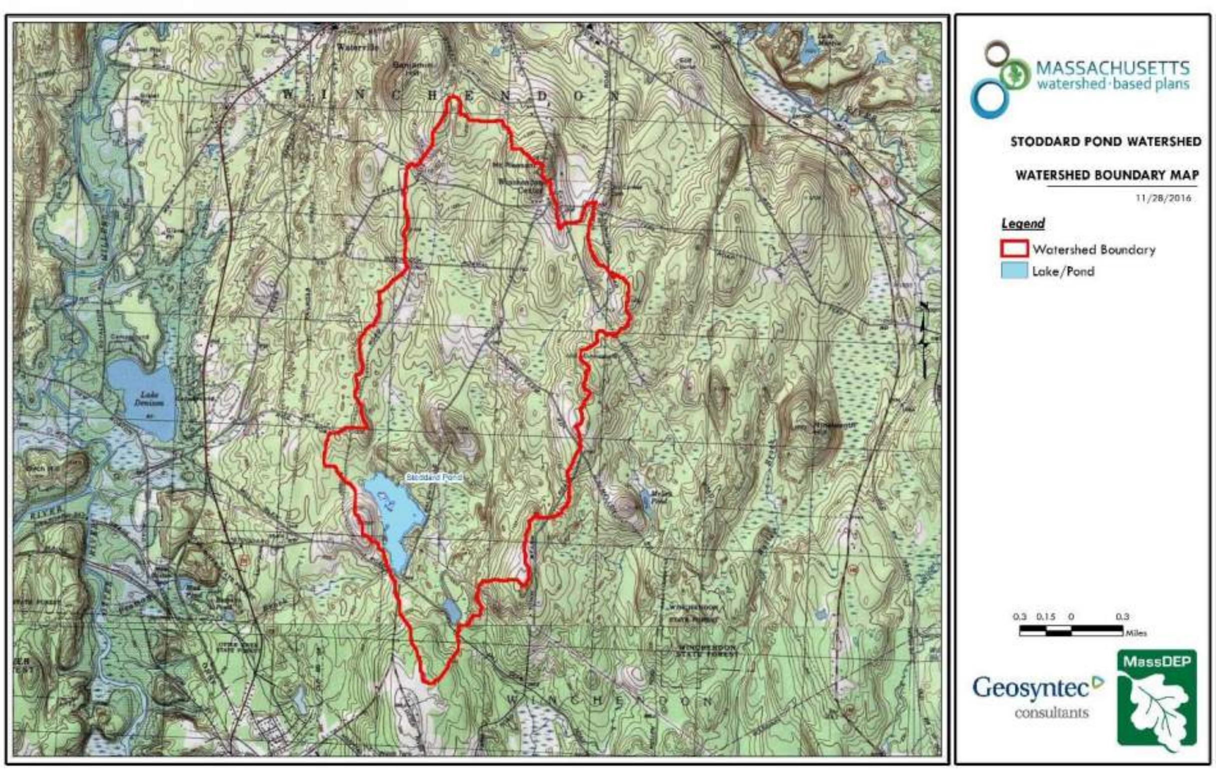


FIGURE 3: Stoddard Pond Watershed

1.3 Overview of Lake Dennison's Watershed

Lake Dennison occupies approximately 83 acres in Winchendon. The pond is located north of New Boston Road, east of Royalston Road South, and west of Baldwinville State Road. The pond is fed from the east by two small unnamed streams and discharges westward to Millers River. The total watershed of Lake Dennison is approximately 3.3 square miles. Land use within the lake's watershed includes 12.2% low density residential and 2.3% agricultural.

Lake Dennison is owned by the Army Corps of Engineers and is maintained by the Massachusetts Department of Conservation and Recreation.

Figure 4, below, shows the location of Lake Dennison and the approximate watershed using the Massachusetts Watershed-Based Plan toolkit.

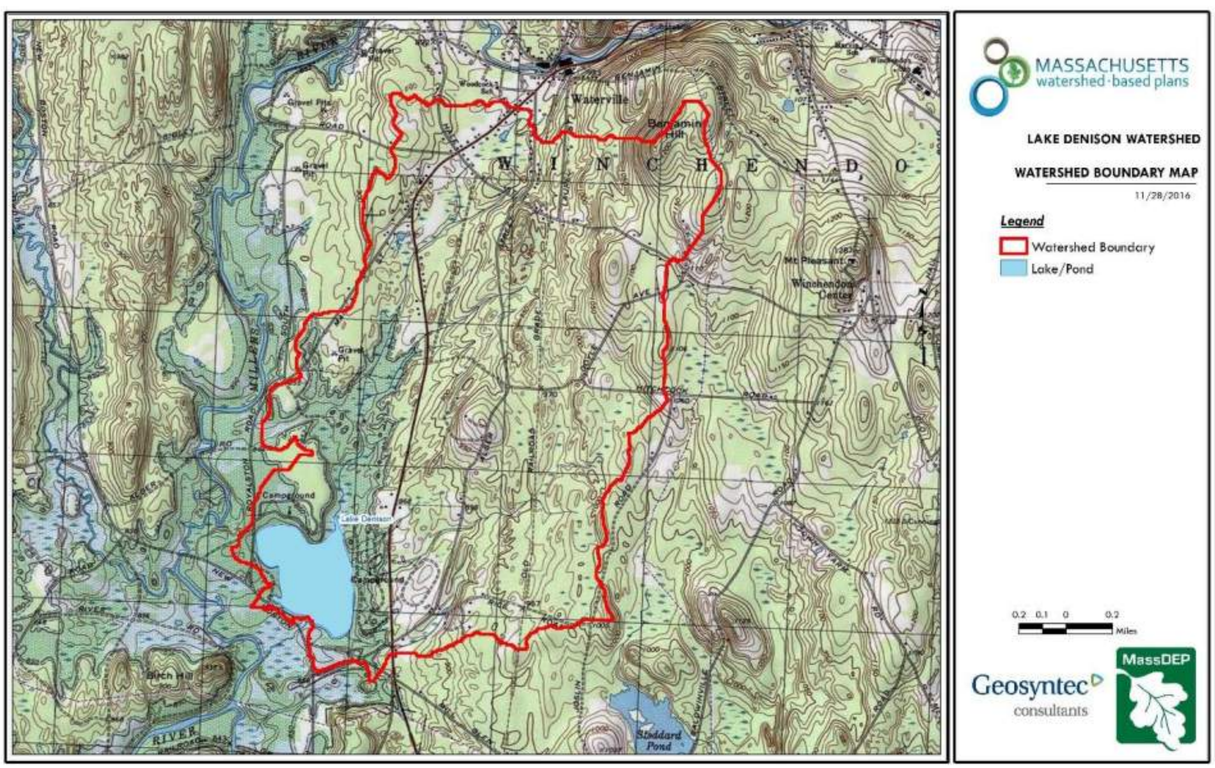


FIGURE 4: Lake Dennison Watershed

1.4 Overview of White's Mill Pond's Watershed

White's Mill Pond occupies approximately 42 acres in Winchendon. The pond is located south of Lakeview Drive and east of Glenallen Street. The pond is fed by Lake Monomonac via a small 5-foot-wide dam located at the intersection of Beach View Drive and Lakeview Drive, as well as from a small stream from Lake Jones south of the pond, and discharges via a 16-foot dam to the North Branch of Millers River. The watershed of White's Mill Pond is approximately 0.9 square miles. The Watershed-Based Plan cited a 2002 MRPC report that indicated a sand and gravel operation in close vicinity to White's Mill Pond may be a potential non-point source of phosphorus pollution. Of the 0.9 square miles of watershed area, only 1.6% is residential (low density) land use. Therefore, residential septic systems are not expected to be a major contributor to elevated phosphorus levels. As stated above, **the watershed for White's Mill Pond and its tributaries are located outside of Winchendon's MS4 area, and are not subject to the LPCP requirements of the MS4GP.**

Figure 5, below, shows the location of White's Mill Pond and the approximate watershed using the Massachusetts Watershed-Based Plan toolkit.

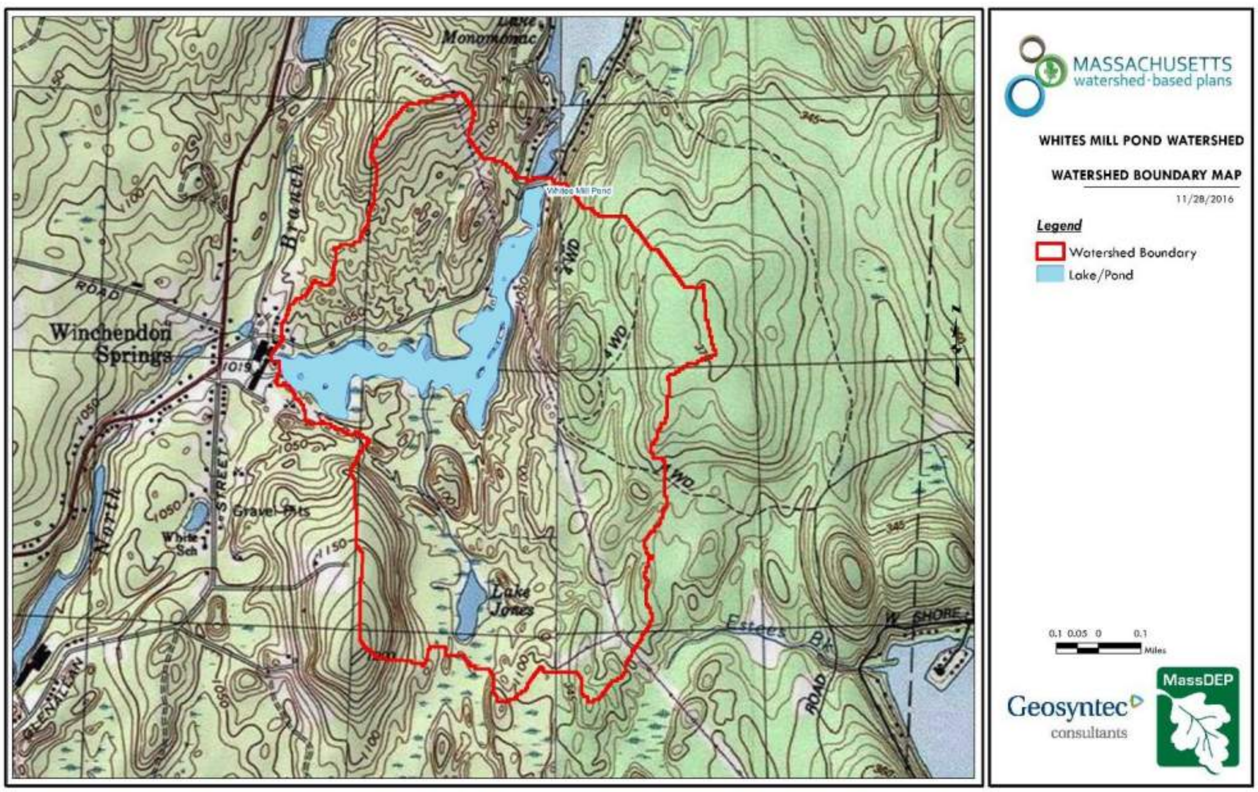


FIGURE 5: White's Mill Pond Watershed

1.5 Overview of Lake Monomonac's Watershed

Lake Monomonac occupies approximately 594 acres in Rindge, New Hampshire and Winchendon. In Winchendon, the pond is located on the border of Rindge, New Hampshire in the northern most part of Winchendon, east of Glenallen Road, and north of West Monomonac Road. The lake's outlet is North Branch Millers River to the south via White's Mill Pond. The watershed of Lake Monomonac within Massachusetts is approximately 2.08 square miles. As stated above, **the watershed for Lake Monomonac and its tributaries are located outside of Winchendon's MS4 area, and are not subject to the LPCP requirements of the MS4GP.**

Figure 6, below, shows the location of Lake Monomonac and the approximate watershed using the Massachusetts Watershed-Based Plan toolkit.

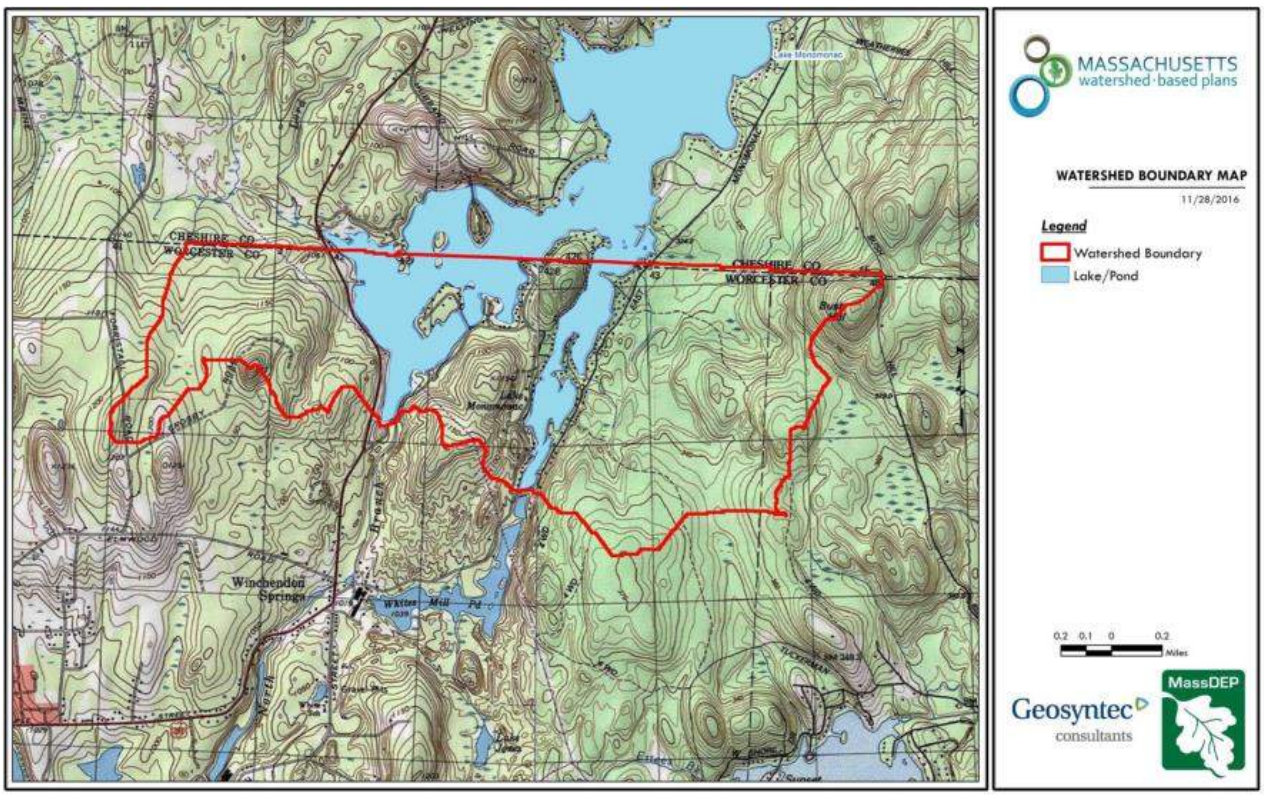


FIGURE 6: Lake Monomonac Watershed

2.0 EPA's Lake (and Pond) Phosphorus Reduction Requirements

The MS4GP requires Winchendon to develop a written LPCP and fully implement all control measures as soon as possible but no later than June 30, 2035 (17 years from effective date of MS4GP). The MS4GP specifies the following phosphorus reduction requirements:

- 16% in Whitney Pond,
- 24% in Stoddard Pond, and
- 22% in Lake Dennison.

The LPCP includes the following milestones:

By June 30, 2022:	Legal analysis
By June 30, 2023:	Funding source assessment
By June 30, 2024:	Define LPCP scope/area and calculate baseline phosphorus, allowable phosphorus load, and phosphorus reduction requirement
By June 30, 2025:	Describe planned non-structural and structural controls, operation & maintenance (O&M) program, implementation schedule, costs, funding sources assessment (update), and prepare a fully written LPCP

The following sections of this memorandum include the legal analysis, funding source assessment, and LPCP scope and phosphorus load requirements. The MS4GP assumes phosphorus will first be addressed with non-structural controls, assessing performance of those controls, and then adding structural controls and assessing performance over the remaining years through 2035.

2.1 LPCP "Legal Analysis" Requirements

According to Appendix F of the MS4GP, as part of developing and implementing a LPCP designed to reduce the amount of phosphorus in stormwater discharges from the MS4 to Whitney Pond, Stoddard Pond, Lake Dennison, and their tributaries, Winchendon must conduct an analysis of local legal authority that may be necessary to effectively implement the entire LPCP (termed by EPA as a "legal analysis"). A description of the Phase 1 PCP Legal Analysis, as stated in the MS4GP, reads as follows:

> *The permittee shall develop and implement an analysis that identifies existing regulatory mechanisms available to the MS4 such as by-laws and ordinances and describes any changes to these regulatory mechanisms that may be necessary to effectively implement the LPCP. This may include the creation or amendment of financial and regulatory authorities. The permittee shall adopt necessary regulatory changes by the end of the permit term.*

Tighe & Bond has prepared this LPCP Legal Analysis to identify existing regulatory mechanisms available to the Town such as bylaws and regulations and any changes to regulatory mechanisms that may be necessary to effectively implement the entire LPCP. The following includes an analysis of available non-structural[2], semi-structural[3], and structural[4], phosphorus reduction actions; current legal authority of the Town to implement those actions on both public and private property; and future changes that would be required to fully implement the LPCP.

2.1.1 Legal Authority to Implement the LPCP on Public Property

Current Authority

The Town of Winchendon has authority to undertake all structural and non-structural controls on public property. Public property consists of Town owned or operated parcels including parking lots, as well as municipal roadways and the right of way. Winchendon can complete street sweeping, catch basin cleaning, and although perhaps not desired, an enhanced Organic Waste and Leaf Litter Collection program, both now and in the future. Winchendon has authority to install structural or semi-structural BMPs on Town-owned lands.

Changes Needed

There are no legal changes necessary to implement the LPCP on public property. However, requiring all public new and redevelopment projects to implement structural BMPs, beyond those required by current local code, requires buy-in from municipal officials and planning for these efforts in capital and operational budgets.

2.1.2 Legal Authority to Implement the LPCP on Private Property

Current Authority

Local Code:

- Stormwater Management Bylaw and Regulations: The Town's Stormwater Management Bylaw[5] outlines the following thresholds for projects requiring a Land Disturbance Permit or Administrative Review and Approval through the Planning Board:

    1. Construction activities that individually or as part of a Common Plan of Development will result in land disturbance of one acre or more;
    2. Any project requiring Site Plan or Subdivision review by the Planning Board; or
    3. The disturbance of more than 5,000 square feet of land where the proposed use is a land use of higher potential pollutant loads pursuant to the Massachusetts Stormwater Management Standards.

    Section 31.15, Part C of the Bylaw states: "To obtain a Land Disturbance Permit, the applicant must show that site design, construction site stormwater runoff control and post-construction stormwater management will meet the standards set by the Stormwater Authority in its regulations, rules and/or guidance, which shall be at least **as stringent as the relevant requirements of the MS4 Permit** and may also address

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[2] Non-structural BMPs include enhanced street sweeping, catch basin cleaning, and enhanced organic waste and leaf litter collection.
[3] Semi-structural BMPs include impervious area disconnection through storage (e.g., rain barrels, cisterns, etc.), impervious area disconnection, conversion of impervious area to permeable pervious area, and soil amendments to enhance permeability of pervious areas.
[4] Structural BMPs include infiltration trench, infiltration basin or other surface infiltration practice, bio-filtration practice, gravel wetland system, porous pavement, wet pond or wet detention basin, dry pond or detention basin, dry water quality swale/grass swale.
[5] The Town's Stormwater Management Bylaw is Article 31 of the General Bylaws, adopted at the May 17, 2021 Annual Town Meeting.

relevant environmental considerations including (without limitation) **protection of aquifers and sensitive water bodies**, climate resilience, and prevention of flooding."

As outlined in the associated Regulations[6], stormwater management systems installed on new development and redevelopment sites must meet total phosphorus removal standards as outlined in the MS4GP. Additionally, the Regulations require applicants to implement structural and non-structural stormwater BMPs that are optimized to remove the pollutant(s) responsible for nearby waterbody impairments or TMDLs, which includes this Millers River Basin phosphorus TMDL.

- Title V: Title V applies to subsurface sewage disposal systems (septic systems) of 10,000 gallons per day or less that must conform to 310 CMR 15.00. This includes private residential properties in Winchendon. Implementation of the Town's Title V code and providing educational materials about proper maintenance to septic system owners can help reduce phosphorus loadings to local waters via leaching or failing systems. This is particularly important in residential areas surrounding Winchendon's lakes and ponds where seasonal cottages have been converted to year-round residences.

Non-Structural BMPs:

- Catch Basin Cleaning: Catch basin cleaning on private properties by a private entity can only be enforced under a local permit or Order of Conditions that requires catch basin cleaning through an O&M Plan currently required under jurisdiction of Wetlands, Stormwater, and/or Site Plan Review.
- Enhanced Sweeping: Winchendon has no authority to physically sweep on private roads, driveways, or parking areas. Similar to catch basin cleaning, this could be required as an ongoing condition through an O&M Plan required by the Planning Board or Conservation Commission.
- Enhanced Organic Waste and Leaf Litter Collection Program: Winchendon has no authority to require this work on private property; further, the Town has no control over the method of disposal on private individual properties. **Currently, Winchendon does not offer any type of leaf litter collection program.** In order to meet the Enhanced Organic Waste and Leaf Litter Collection program requirements in Appendix F of the MS4GP, the Town must gather and remove all landscaping wastes, organic debris, and leaf litter from impervious roadways and parking lots at least once per week during the period of September 1 to December 1 of each year.

Semi-Structural BMPs: There is limited opportunity to require semi-structural BMPs through current code.

Structural BMPs: Structural BMPs on private properties can only be required through local permitting such as an Order of Conditions or Land Disturbance Permit, which includes phosphorus removal requirements as outlined in the 'Local Code' section above. The Land Disturbance Permit also requires an O&M Plan, Stormwater Management Plan, and Erosion and Sedimentation Control Plan for any BMPs installed as part of permit conditions to ensure long-term maintenance. **Currently, there are no means for the Town to require retroactive installation of structural BMPs for a completed project on private property.**

[6] The Town's Stormwater Management Regulations were adopted by the Planning Board in November 2021.

Changes Needed

To fully implement the LPCP on private property, there would need to be significant changes to local and/or state and federal permitting. Some changes to consider include:

- Changes to roadway width, parking, and other requirements in zoning and subdivision that result in creation of impervious cover.
- Development of a rain barrel program.
- Although politically challenging, developing a Stormwater Utility or Enterprise Fund is a way to incentivize private sites to take their own actions through a credit system. Currently, there are approximately 25 communities in Massachusetts that have successfully developed Stormwater Enterprise Funds. The rates for residents range from $6 to $99 per quarter.[7]
- By the end of Permit Year 6 (June 30, 2024), the Town will be required to complete an assessment of local code to determine where improvements could be made to increase the use of low impact design (LID) and green infrastructure in street design, parking lot guidelines, and construction projects (see Part 2.3.6.b and .c of the MS4GP). In addition to this assessment, the Town should identify options to strengthen local code to reduce phosphorus discharges in the watersheds of Whitney Pond, Stoddard Pond, and Lake Dennison, as well as White's Mill Pond and Lake Monomonac.

2.2 Funding Source Assessment

Phase 2 of the LPCP includes an assessment of possible funding sources that may be used to implement the LPCP. An except from the MS4GP for this phase is as follows:

> *The permittee shall describe known and anticipated funding mechanisms (e.g. general funding, enterprise funding, stormwater utilities) that will be used to fund PCP implementation. The permittee shall describe the steps it will take to implement its funding plan. This may include but is not limited to conceptual development, outreach to affected parties, and development of legal authorities.*

At a meeting on April 25, 2022, Tighe & Bond and Town staff reviewed LPCP requirements and discussed possible funding sources. Potential funding sources discussed with the Town included the following:

- Property Taxes/General Fund, including the DPW Operational Budget and capital projects as needed
- Grants/Loans (e.g., MassDEP State Revolving Fund or U.S. Department of Agriculture)
- Enterprise Fund (i.e., "Drainage Fee" via Stormwater Utility)

The Town currently funds MS4 program compliance through a mix of Department of Public Works operating budget, grants and loans, and the General Fund. While the true cost of implementing the LPCP is unknown at this time, a mix of the above funding sources could be used to meet the requirements on public and municipal property.

Through implementation of the Winchendon Stormwater Management Regulations, which were adopted in November 2021 by the Planning Board acting as the Stormwater Authority, some of

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[7] MassDEP developed a Massachusetts Stormwater Fee Summary spreadsheet for the current communities with Stormwater Enterprise Funds. The spreadsheet can be found here: https://www.mass.gov/info-details/stormwater#local-stormwater-permitting-and-management-

the onus of phosphorus reduction and water quality improvements shifts to private developers or property owners. The Town intends to pursue a MassDEP SRF Assessment Management Program grant to assist with some of the future MS4GP compliance requirements. If the Town elected to adopt an overlay district for the MS4 regulated area, they may be able to pursue USDA funding because they would then be within the program's population eligibility requirements.

Funding sources, including establishment of a stormwater utility/fee, will be re-evaluated in Permit Year 7 once the costs and schedule of the LPCP are known.

2.3 LPCP Scope (LPCP Area)

Phase 3 of the LPCP requires the Town to determine the scope of implementation for the LPCP. An excerpt from the MS4GP for this phase is as follows:

> *The permittee shall indicate the area in which the permittee plans to implement the LPCP, this area is known as the "LPCP Area". The permittee must choose one of the following: 1) to implement its LPCP in the entire area within its jurisdiction discharging to the impaired waterbody (for a municipality this would be the municipal boundary) or 2) to implement its LPCP in only the urbanized area portion of its jurisdiction discharging to the impaired waterbody. If the permittee chooses to implement the LPCP in its entire jurisdiction discharging to the impaired waterbody, the permittee may demonstrate compliance with the Phosphorus Reduction Requirement and Allowable Phosphorus Load requirements applicable to it through structural and nonstructural controls on discharges that occur both inside and outside the urbanized area. If the permittee chooses to implement the LPCP in its urbanized area only discharging to the impaired waterbody, the permittee must demonstrate compliance with the Phosphorus Reduction Requirement and Allowable Phosphorus Load requirements applicable to it through structural and non-structural controls on discharges that occur within the urbanized area only.*

Approximately 13,415 acres of Winchendon's total 28,224 acres are located within the watersheds of Whitney Pond, Stoddard Pond, White's Mill Pond, and Lake Dennison. Of those 13,415 acres, only 1,255 acres are also located within Winchendon's Urbanized Area (i.e., the area regulated by the MS4GP), with no Urbanized Area located in the White's Mill Pond or Lake Monomonac Watersheds. Per discussions with Town staff, the Town will implement its LPCP only in the Urbanized Area portion of its jurisdiction within the watersheds of Whitney Pond, Stoddard Pond, and Lake Dennison.

2.4 Phosphorus Loadings

Phase 4 of the LPCP includes determining a baseline phosphorus loading and phosphorus reduction requirement within each watershed. The methodology for this analysis is included in Attachment 1 to Appendix F of the MS4GP.[8] An excerpt from the MS4GP for this phase is as follows:

> *Permittees shall calculate their numerical Allowable Phosphorus Load and Phosphorus Reduction Requirement in mass/yr by first estimating their Baseline Phosphorus Load in*

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[8] Attachment 1 to Appendix F of the MS4GP, *Method to Calculate Baseline Phosphorus Load (Baseline), Phosphorus Reduction Requirements and Phosphorus load increases due to development (PDEVinc)*, URL: https://www3.epa.gov/region1/npdes/stormwater/ma/2016fpd/appendix-f-attach-1-2016-ma-sms4-gp-mod.pdf

mass/yr from its LPCP Area consistent with the methodology in Attachment 1 to Appendix F, the baseline shall only be estimated using land use phosphorus export coefficients in Attachment 1 to Appendix F and not account for phosphorus reductions resulting from implemented structural BMPs completed to date. Table F-6 contains the percent phosphorus reduction required from urban stormwater consistent with the TMDL of each impaired waterbody. The permittee shall apply the applicable required percent reduction in Table F-6 to the calculated Baseline Phosphorus Load to obtain the permittee specific Allowable Phosphorus Load. The Allowable Phosphorus Load shall then be subtracted from the Baseline Phosphorus Load to obtain the permittee specific Phosphorus Reduction Requirement in mass/yr.

The **Baseline Phosphorus Load** is a measure of the annual phosphorus load discharging in stormwater from the impervious and pervious areas within the MS4 area in each watershed subject to the LPCP. Watersheds that are more densely developed and have more impervious cover will yield a higher total pollution potential (e.g., a commercial property will have a higher phosphorus loading than forested land). The calculation uses phosphorus loading rates prescribed by EPA for each land use type within the watershed. The sum of loading rates for all land use categories in the watershed is the total Baseline Phosphorus Load for the watershed.

The Phosphorus Pounds Reduction, also referred to as the **Phosphorus Reduction Requirement**, represents the required reduction in annual phosphorus load in stormwater to meet the water quality goals for the impaired watershed. It is calculated by multiplying the Baseline Phosphorus Load by the Required Percent Reduction for each watershed (shown in **Table 1**). This yields the Phosphorus Pounds Reduction.

Table 1 Required Percent Reduction of Phosphorus from Stormwater
(Appendix F, Table F-6)

Waterbody	Required Percent Reduction
Whitney Pond	16%
White's Mill Pond	21%
Stoddard Pond	24%
Lake Dennison	22%

The **Allowable Phosphorus Load** is the amount of phosphorus allowed in stormwater within the impaired watershed annually. This is calculated by subtracting the Phosphorus Reduction Requirement from the Baseline Phosphorus Load.

Table 2 includes a summary of the Baseline Phosphorus, Phosphorus Reduction Requirement, and Allowable Phosphorus Load for each waterbody subject to the LPCP. Note that these loadings were calculated for the LPCP Area of Winchendon's MS4 area (i.e., Urbanized Area) within the watershed, and may not be applicable to the entire watershed.

Table 2 Required Reduction of Phosphorus from Stormwater

Waterbody	Watershed Area in Winchendon (acres)	Watershed Area in Town's MS4 (acres)	Baseline Phosphorus Load (lbs/yr)	Phosphorus Reduction Requirement (lbs/yr)	Allowable Phosphorus Load (lbs/yr)
Whitney Pond	8,477	694	240	38	201
Stoddard Pond	2,019	14	4	1	3
Lake Dennison	2,196	547	113	25	88

Notes:
- lbs/year is pounds per year.
- The watershed areas were determined using StreamStats from USGS and differ slightly from the area provided in the enclosed Watershed-Based Plans.

As noted in **Section 1.0**, the watersheds of Lake Monomonac, White's Mill Pond, and their tributaries are located outside of Winchendon's MS4 area, and LPCP requirements are not enforceable through the MS4GP for this lake. As such, phosphorus loadings were not calculated for these lakes.

The enclosed Watershed-Based Plans include a table entitled "Total Estimated Nonpoint Source Pollution Loads based on GIS Landuse" that summarize the annual phosphorus loading. It should be noted that that there appear to be some differences in the data used for these calculations within the Watershed-Based Plan. The watershed area used for the calculation is different than the watershed area included in Table A-1: "General Watershed Information" (for example, White's Mill Pond watershed area is described as less than 1 square mile in size in Table A-1, but the loading calculations use a watershed area of almost 20 square miles), which may lead to elevated phosphorus loading estimates in the Watershed-Based Plan. Additionally, the loading calculation is not limited to Winchendon's LPCP Area (in the Urbanized Area portion of the Town's jurisdiction within the watersheds of Whitney Pond, Stoddard Pond, and Lake Dennison), so the Plan captures additional loading that is not relevant based on the determined LPCP Area. **Therefore, the loading estimates included in Table 2 supersede the data included in the Watershed-Based Plan and should be used moving forward for the Town's phosphorus reduction requirements.**

3.0 Next Steps

As mentioned in **Section 2.0**, the following phases of the LPCP must be completed within 7 years of the MS4GP effective date (i.e., by June 30, 2025):

- Description of planned non-structural and structural controls,
- Description of O&M program,
- Implementation schedule,
- Cost and funding source assessment (update), and
- Complete written LPCP.

The MS4GP assumes phosphorus will first be addressed with non-structural controls, assessing performance of those controls, and then adding structural controls and assessing performance over the remaining years through 2035.

Enclosures

Excerpts from Massachusetts Year 2018/2020 Integrated List of Waters

Watershed-Based Plan – Whitney Pond

Watershed-Based Plan – Stoddard Pond

Watershed-Based Plan – Lake Dennison

Watershed-Based Plan – White's Mill Pond

Watershed-Based Plan – Lake Monomonac

J:\W\W1157 Winchendon\094 - Permit Year 4 Stormwater Assistance\LPCP\Winchendon LPCP Memo 2022.docx

Excerpts from Massachusetts Year 2018/2020 Integrated List of Waters

Final Massachusetts Integrated List of Waters for the Clean Water Act 2018/2020 Reporting Cycle

Massachusetts Department of Environmental Protection

CN 505.1

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Kathleen A. Theoharides, Secretary
Massachusetts Department of Environmental Protection
Martin Suuberg, Commissioner
Bureau of Water Resources
Kathleen Baskin, Assistant Commissioner

Category 4a waters listed alphabetically by major watershed
"TMDL is completed"

Waterbody	AU_ID	Description	Size	Units	Impairment	ATTAINS Action ID
		From Head of the Pond Road to confluence with Vineyard Haven Harbor at Beach Road, Tisbury/Oak Bluffs, Martha's Vineyard.		Square Miles	Dissolved Oxygen	64584
					Estuarine Bioassessments	64583
					Estuarine Bioassessments	64584
					Nitrogen, Total	64583
					Nitrogen, Total	64584
					Nutrient/Eutrophication Biological Indicators	64583
					Nutrient/Eutrophication Biological Indicators	64584
Miacomet Pond	MA97055	Nantucket.	34.00	Acres	Mercury in Fish Tissue	33880
North Head Long Pond	MA97-34	tidally restricted brackish water, Nantucket.	0.07	Square Miles	Nutrient/Eutrophication Biological Indicators	64481
Tom Nevers Pond	MA97097	Nantucket.	11.00	Acres	Mercury in Fish Tissue	33880
Trapps Pond	MA97-32	Edgartown.	0.07	Square Miles	Dissolved Oxygen	65321
					Estuarine Bioassessments	65321
					Nitrogen, Total	65321
					Nutrient/Eutrophication Biological Indicators	65321
Merrimack						
Forge Pond	MA84015	Westford/Littleton.	203.00	Acres	(Curly-leaf Pondweed*)	
					(Fanwort*)	
					(Water Chestnut*)	
					Mercury in Fish Tissue	33880
Knops Pond/Lost Lake	MA84084	Groton.	187.00	Acres	(Eurasian Water Milfoil, Myriophyllum Spicatum*)	
					(Fanwort*)	
					(Non-Native Aquatic Plants*)	
					Mercury in Fish Tissue	33880
Locust Pond	MA84031	Tyngsborough.	16.00	Acres	Mercury in Fish Tissue	33880
Millers						
Bents Pond	MA35007	Gardner.	6.00	Acres	Algae	4115
					Turbidity	4115
Hilchey Pond	MA35029	Gardner.	8.00	Acres	Turbidity	4128
Lake Denison	MA35017	Winchendon.	83.00	Acres	Dissolved Oxygen	4123
					Mercury in Fish Tissue	33880
Lake Rohunta	MA35106	(North Basin) Athol/Orange.	34.00	Acres	(Non-Native Aquatic Plants*)	
					Mercury in Fish Tissue	33880
Moores Pond	MA35048	Warwick.	39.00	Acres	Mercury in Fish Tissue	42398

*TMDL not required (Non-pollutant)

Category 4a waters listed alphabetically by major watershed
"TMDL is completed"

Waterbody	AU_ID	Description	Size	Units	Impairment	ATTAINS Action ID
Parker Pond	MA35056	Gardner.	32.00	Acres	(Aquatic Plants (Macrophytes)*)	
					(Non-Native Aquatic Plants*)	
					Nutrient/Eutrophication Biological Indicators	4134
Reservoir No. 1	MA35063	Athol.	8.00	Acres	(Aquatic Plants (Macrophytes)*)	
					Nutrient/Eutrophication Biological Indicators	4137
Upper Naukeag Lake	MA35090	Ashburnham.	305.00	Acres	Mercury in Fish Tissue	33880
Upper Reservoir	MA35091	Westminster.	42.00	Acres	Mercury in Fish Tissue	33880
Whites Mill Pond	MA35099	Winchendon.	42.00	Acres	(Aquatic Plants (Macrophytes)*)	
					Nutrient/Eutrophication Biological Indicators	4144
Mount Hope Bay (Shore)						
Kickamuit River	MA61-08	Headwaters, outlet Warren Reservoir, Swansea, to state line, Swansea, MA/Warren, RI.	2.80	Miles	Escherichia Coli (E. Coli)	30702
					Fecal Coliform	30702
Lewin Brook Pond	MA61011	Swansea.	11.00	Acres	Mercury in Fish Tissue	33880
North Watuppa Pond	MA61004	Fall River/Westport.	1,728.00	Acres	Mercury in Fish Tissue	33880
Sawdy Pond	MA61005	Westport/Fall River.	369.00	Acres	Mercury in Fish Tissue	42407
Narragansett Bay (Shore)						
Fullers Brook	MA53-12	Headwaters in wetland north of Jacobs Street, Seekonk to confluence with Palmer River, Rehoboth.	1.70	Miles	Escherichia Coli (E. Coli)	35089
Oak Swamp Brook	MA53-15	Headwaters in Oak Swamp east of School Street, Rehoboth to confluence with Rocky Run, Rehoboth.	3.00	Miles	Escherichia Coli (E. Coli)	35091
Palmer River	MA53-03	From Route 6 bridge, Rehoboth to state line, Swansea, MA/Barrington, RI.	0.11	Square Miles	Fecal Coliform	35085
Palmer River	MA53-05	From the Shad Factory Pond dam (NATID: MA00787), Rehoboth to the Route 6 bridge, Rehoboth (formerly part of 2000 segment: Palmer River MA53-02).	0.09	Square Miles	Fecal Coliform	35087
Rocky Run	MA53-16	Headwaters in wetland east of Simmons Street, Rehoboth to approximately 0.1 mile east of Mason Street, Rehoboth (prior to 2010 this segment included estuarine portion).	8.60	Miles	Escherichia Coli (E. Coli)	35096
					Fecal Coliform	35096
Rocky Run	MA53-18	approximately 0.1 mile east of Mason Street, Rehoboth to confluence with Palmer River, Rehoboth (formerly part of 2008 segment: Rocky Run MA53-16).	0.003	Square Miles	Fecal Coliform	35096
Torrey Creek	MA53-14	Headwaters in wetland east of Benson Avenue, Seekonk to Barney Avenue, Rehoboth (includes culverted section	2.10	Miles	(Alteration in stream-side or littoral vegetative covers*)	

Category 4c waters listed alphabetically by major watershed
"Impairment not caused by a pollutant – TMDL not required"

Waterbody	AU_ID	Description	Size	Units	Impairment
Lower Four Mile Pond	MA92032	Boxford.	18.00	Acres	(Non-Native Aquatic Plants*)
Stevens Pond	MA92062	Boxford.	11.00	Acres	(Non-Native Aquatic Plants*)
Merrimack					
Lake Gardner	MA84018	Amesbury (size indicates portion in Massachusetts) (formerly part of 2000 segment: Powwow River MA84A-07).	96.00	Acres	(Fish Passage Barrier*)
Lake Mascuppic	MA84037	Tyngsborough/Dracut.	210.00	Acres	(Curly-leaf Pondweed*)
					(Fanwort*)
Millers					
Bourn-Hadley Pond	MA35008	Templeton.	26.00	Acres	(Aquatic Plants (Macrophytes)*)
Brazell Pond	MA35010	Templeton.	15.00	Acres	(Aquatic Plants (Macrophytes)*)
Depot Pond	MA35018	(Railroad Pond) Templeton.	15.00	Acres	(Aquatic Plants (Macrophytes)*)
Ellis Pond	MA35023	Athol.	88.00	Acres	(Aquatic Plants (Macrophytes)*)
					(Eurasian Water Milfoil, Myriophyllum Spicatum*)
					(Non-Native Aquatic Plants*)
Greenwood Pond	MA35026	Templeton.	12.00	Acres	(Aquatic Plants (Macrophytes)*)
South Athol Pond	MA35078	Athol.	83.00	Acres	(Aquatic Plants (Macrophytes)*)
					(Non-Native Aquatic Plants*)
Stoddard Pond	MA35083	Winchendon.	52.00	Acres	(Aquatic Plants (Macrophytes)*)
White Pond	MA35098	Athol.	63.00	Acres	(Non-Native Aquatic Plants*)
Mount Hope Bay (Shore)					
Cole River	MA61-03	Wood Street, Swansea to Route 6, Swansea.	1.60	Miles	(Fish Passage Barrier*)
Nashua					
Chaffin Pond	MA81017	Holden.	90.00	Acres	(Fanwort*)
					(Non-Native Aquatic Plants*)
Coachlace Pond	MA81019	Clinton.	31.00	Acres	(Curly-leaf Pondweed*)
					(Hydrilla*)
					(Non-Native Aquatic Plants*)
Crocker Pond	MA81025	Westminster.	101.00	Acres	(Non-Native Aquatic Plants*)
Dawson Pond	MA81028	Holden.	22.00	Acres	(Fanwort*)
					(Non-Native Aquatic Plants*)
Eagle Lake	MA81034	Holden.	56.00	Acres	(Non-Native Aquatic Plants*)
Flannagan Pond	MA81044	Ayer.	80.00	Acres	(Curly-leaf Pondweed*)
					(Fanwort*)
					(Non-Native Aquatic Plants*)
Lake Samoset	MA81116	Leominster.	35.00	Acres	(Non-Native Aquatic Plants*)
Lake Whalom	MA81154	Lunenburg/Leominster.	97.00	Acres	(Curly-leaf Pondweed*)

*TMDL not required (Non-pollutant)

Category 5 waters listed alphabetically by major watershed
The 303(d) List – “Waters requiring a TMDL"

Waterbody	AU_ID	Description	Size	Units	Impairment	ATTAINS Action ID
Millers						
Beaver Brook	MA35-09	Fernald School discharge, Templeton to confluence with Millers River, Royalston.	3.40	Miles	PCBs in Fish Tissue	
Beaver Brook	MA35-28	Headwaters, confluence of Kendall and Chickering brooks, Phillipston to the Fernald School (MA0102156) discharge, Templeton.	2.30	Miles	PCBs in Fish Tissue	
Boyce Brook	MA35-17	NH State Line, Royalston to confluence with East Branch Tully River, Royalston.	3.20	Miles	PCBs in Fish Tissue	
East Branch Tully River	MA35-29	From the outlet of Tully Lake, Royalston to confluence with the West Branch Tully River forming headwaters Tully River, Orange/Athol (formerly reported as a portion of MA35-12).	3.50	Miles	PCBs in Fish Tissue	
East Branch Tully River	MA35-30	Confluence of Tully Brook and Falls Brook in Royalston State Forest, Royalston through Long Pond to inlet Tully Lake, Royalston (formerly reported as a portion of MA35-12).	5.40	Miles	PCBs in Fish Tissue	
Ellinwood Brook	MA35-22	Headwaters, outlet unnamed pond east of Woodlawn Road, Athol to inlet of White Pond, Athol.	3.60	Miles	PCBs in Fish Tissue	
Gales Pond	MA35024	Warwick.	12.00	Acres	Mercury in Fish Tissue	33880
					Turbidity	
Jacks Brook	MA35-31	Headwaters south of Orange Road, Northfield to mouth at confluence with Keyup Brook, Erving.	2.70	Miles	PCBs in Fish Tissue	
Keyup Brook	MA35-16	Headwaters Great Swamp Northfield State Forest, Northfield, to confluence with Millers River, Erving.	5.00	Miles	Escherichia Coli (E. Coli)	
					PCBs in Fish Tissue	
Lake Monomonac	MA35047	Massachusetts portion only. Winchendon/Rindge,N.H.	186.00	Acres	(Non-Native Aquatic Plants*)	
					Mercury in Fish Tissue	
Lake Rohunta	MA35070	(Middle Basin) Athol/Orange/New Salem.	209.00	Acres	(Non-Native Aquatic Plants*)	
					Aquatic Plants (Macrophytes)	
					Mercury in Fish Tissue	33880
Lake Rohunta	MA35107	(South Basin) New Salem.	42.00	Acres	(Non-Native Aquatic Plants*)	
					Aquatic Plants (Macrophytes)	
					Mercury in Fish Tissue	33880
Laurel Lake	MA35035	Erving/Warwick.	44.00	Acres	Dissolved Oxygen	
Lawrence Brook	MA35-13	New Hampshire state line, Royalston through Doane Falls to confluence with East Branch Tully River at inlet Tully Lake, Royalston.	7.10	Miles	PCBs in Fish Tissue	
Lyons Brook	MA35-19	Outlet of Ruggles Pond, Wendell to confluence with Millers River, Montague/Wendell.	2.10	Miles	PCBs in Fish Tissue	

**TMDL not required (Non-pollutant)*
[ ] provided as further explanation of ATTAINS impairment code

Category 5 waters listed alphabetically by major watershed
The 303(d) List – “Waters requiring a TMDL"

Waterbody	AU_ID	Description	Size	Units	Impairment	ATTAINS Action ID
West Branch Tully River	MA35-11	Outlet Sheomet Lake, Warwick to confluence with East Branch Tully River forming headwaters Tully River, Orange/Athol.	6.60	Miles	PCBs in Fish Tissue	
					Temperature	
West Gulf Brook	MA35-24	From headwaters west of Paine Swamp Road, Athol to confluence with Millers River, Athol.	0.80	Miles	PCBs in Fish Tissue	
Whetstone Brook	MA35-18	Headwaters northeast of Orcutt Hill near New Salem Rd, Wendell to confluence with Millers River, Wendell.	4.90	Miles	PCBs in Fish Tissue	
Whitney Pond	MA35101	Winchendon.	97.00	Acres	(Aquatic Plants (Macrophytes)*)	
					Mercury in Fish Tissue	
					Turbidity	4145
Mount Hope Bay (Shore)						
Cole River	MA61-04	Route 6, Swansea to the mouth at Mount Hope Bay at old railway grade, Swansea.	0.35	Square Miles	Chlorophyll-a	
					Dissolved Oxygen	
					Fecal Coliform	38907
					Nitrogen, Total	
Lee River	MA61-01	From confluence with Lewin Brook, Swansea to Route 6, Swansea/Somerset.	0.02	Square Miles	Fecal Coliform	38905
					Nutrient/Eutrophication Biological Indicators	
Lee River	MA61-02	Route 6, Swansea/Somerset to mouth at Mount Hope Bay, Swansea/Somerset.	0.51	Square Miles	Chlorophyll-a	
					Dissolved Oxygen	
					Fecal Coliform	38906
					Nitrogen, Total	
Lewin Brook	MA61-09	Headwaters, west of Sharps Lot Road, Swansea to the inlet of the unnamed impoundment north of Lewin Lane, Swansea (impoundment upstream of dam, NAT ID# MA03247).	1.90	Miles	Escherichia Coli (E. Coli)	
Mount Hope Bay	MA61-06	The Massachusetts portion just upstream of the Braga Bridge, Fall River/Somerset to the state border Fall River, MA/Tiverton, RI to the line from Brayton Point Somerset to MA/RI border approximately 3/4 of a mile due east of Spar Island, RI.	2.32	Square Miles	Chlorophyll-a	
					Dissolved Oxygen	
					Enterococcus	38908
					Fecal Coliform	38908
					Fish Bioassessments	
					Nitrogen, Total	
Mount Hope Bay	MA61-07	the Massachusetts portion from mouth of Cole River (at old railway grade), Swansea to state border Swansea, MA/Warren, RI to the line from Brayton Point, Somerset to MA/RI border approximately 3/4 of a mile due east of Spar Island, RI to the line between Bay Point, Swansea and Brayton Point, Somerset (the mouth of the Lee River).	1.84	Square Miles	Chlorophyll-a	
					Dissolved Oxygen	
					Enterococcus	38909
					Fecal Coliform	38909
					Fish Bioassessments	
					Nitrogen, Total	

**TMDL not required (Non-pollutant)*
[ ] provided as further explanation of ATTAINS impairment code

Watershed-Based Plan – Whitney Pond

MASSACHUSETTS
watershed·based plans

WATERSHED-BASED PLAN

Whitney Pond

April 29, 2021

Prepared By:

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100 Front Street, Suite 7
Worcester, MA

Prepared For:

MassDEP
Commonwealth of Massachusetts
Department of Environmental Protection

Contents

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).

1. General Watershed Information

Table A-1: General Watershed Information

Watershed Name (Assessment Unit ID):	WhitneyPond (MA35101)
Major Basin:	MILLERS
Watershed Area (within MA):	19596 (ac)
Water Body Size:	97 (ac)

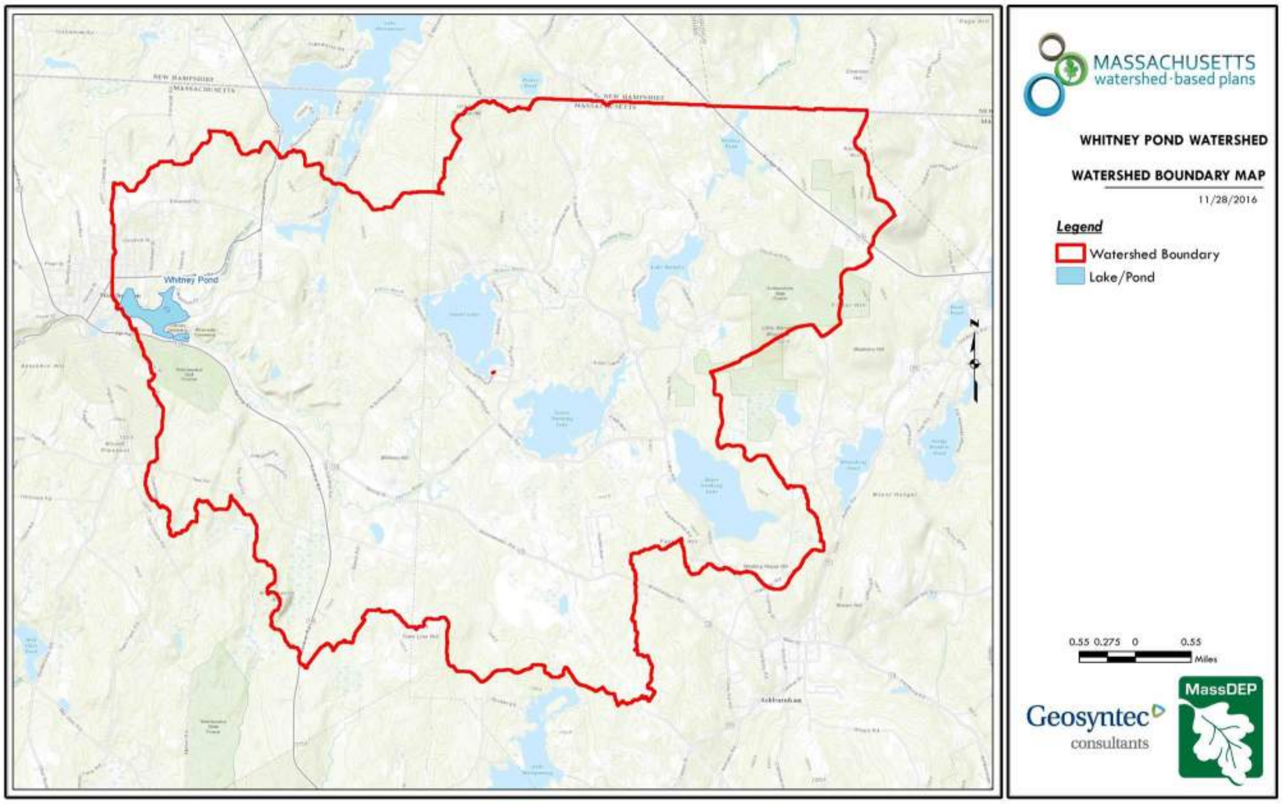

Figure A-1: Watershed Boundary Map (MassGIS, 1999; MassGIS, 2001; USGS, 2016)

Ctrl + Click on the map to view a full sized image in your web browser.

General watershed information:

2. MassDEP Water Quality Assessment Report and TMDL Review

The following reports are available:

- Millers River Watershed 2000 Water Quality Assessment Report
- Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

Millers River Watershed 2000 Water Quality Assessment Report (MA35101 - Whitney Pond)

LAKE USE ASSESSMENTS
Lake assessments are based on information gathered during DWM surveys (recent and historic) as well as pertinent information from other reliable sources (e.g., abutters, herbicide applicators, diagnostic/feasibility studies, MA DPH, etc.). The 1995 DWM synoptic surveys focused on general observations of water quality and quantity (e.g., water level, sedimentation, etc.), the presence of native and non-native aquatic plants (as well as distribution and aerial cover), and presence/severity of algal blooms (Appendix B, Table B1). During 2000 more intensive in-lake sampling was conducted by DWM in two lakes (Stoddard and Whitney ponds) in the Millers River Watershed as part of the TMDL program. This sampling included in-lake measurements of dissolved oxygen, pH, temperature, Secchi disk transparency, nutrients, and chlorophyll a and detailed macrophyte mapping (Appendix B, Tables B2 and B3). While these surveys provided additional information to assess the status of the designated uses fecal coliform bacteria data were unavailable and, therefore, the Primary Contact Recreational Use was usually not assessed. To determine the status of the Fish Consumption Use fish consumption advisory information was obtained from the MA DPH (MA DPH 2002a). Although the Drinking Water Use was not assessed in this water quality assessment report the Class A waters were identified. Information on drinking water source protection and finish water quality is available at http://www.mass.gov/dep/brp/dws/dwshome.htm and from the Millers River Watershed's public water suppliers.

The use assessments and supporting information are entered into an EPA assessment database (either the WBS or the ADB). Data on the presence of non-native plants were entered into the MA DEP DWM informal non-native plant-tracking database.

AQUATIC LIFE
Habitat and Flow
Using guidelines developed by MA DEM to identify a river basin's stress level the Upper Naukeag Lake with a watershed drainage area of 1.90 square miles was rated at a high stress level based on the magnitude of stream flow. The criteria established for the high stress classification is net outflow equals or exceeds estimated natural August median flow (Gomez and Sullivan 2003). Because of the water withdrawals the Aquatic Life Use is identified with an Alert Status for this lake (Table 5).

Biology
Non-native aquatic macrophytes were observed in eight of the 65 lakes surveyed by DWM in 1995 and/or 2000 (Table 10 and Appendix B, Table B1). The three non-native aquatic species documented in the Millers River Watershed lakes were Myriophyllum heterophyllum (variable water milfoil), M. spicatum (Eurasian water milfoil) and Cabomba caroliniana (fanwort) (Figure 13). The mere presence of these species is considered an imbalance to the native biotic community and so these lakes are listed as impaired (808.9 acres). Additionally, these species have a high potential for spreading and are likely to have established themselves in downstream lake and river segments in the Millers River Watershed which may not have been surveyed. Figure 13 indicates where these non-native aquatic species were observed and the likely, or potential, avenues of downstream spreading.

Two non-native wetland species, Lythrum salicaria (purple loosestrife) and Phragmites australis (reed grass), were identified at three of the lakes surveyed by DWM in 1995 and/or 2000 (Table 5 and Appendix B, Table B1). Although the presence of these species is not generally a cause of impairment to lakes their invasive growth habit can result in the impairment of wetland habitat associated with lakes. Because of an unconfirmed report of a non-native species presence (Myriophyllum heterophyllum) in Sunset Lake (Ashburnham/Winchendon) the Aquatic Life Use there is identified with an Alert Status (Table 5).

Fish sampling using electrofishing, gillnetting, and shoreline seining was conducted in Stoddard and Whitney ponds in the Millers River Watershed by MA DFWELE in 2000 as part of the Lakes Survey for TMDL Development (Appendix E, Project 99-06/104). The fish sampling consisted of electrofishing at night during the spring and gillnetting and shoreline seining in the fall. A total of 10 species were collected in Stoddard Pond. The species collected, in order of abundance, were: yellow perch (Perca flavescens), golden shiner (Notemigonus crysoleucas), pumpkinseed (Lepomis gibbosus), black crappie (Pomoxis nigromaculatus), largemouth bass (Micropterus salmoides), chain pickerel (Esox niger), yellow bullhead (Ictalurus natalis), creek chubsucker (Erimyzon oblongus), brown bullhead (Ictalurus nebulosus), and bluegill (Lepomis macrochirus). A total of 13 species were collected in Whitney Pond. The species collected, in order of abundance, were: yellow perch, bluegill, black crappie, white sucker (Castosomus commersoni), pumpkinseed, golden shiner, largemouth bass, chain pickerel, creek chubsucker, brown bullhead, yellow bullhead, white perch (Morone americana), and tessellated darter (Etheostoma olmstedi).

[See figure on page 153 of Water Quality Assessment Report]

Beaver Flowage Pond
MA DFWELE conducted fish population sampling on Beaver Flowage Pond in Royalston using gillnet, angling and a barge electroshocker on August 29, 2000. Using the gillnet, a total of 62 fish represented by 7 species were collected. Fish species

present, in order of abundance, were the following: largemouth bass (Micropterus salmoides), yellow perch (Perca flavescens), bluegill (Lepomis macrochirus), golden shiner (Notemigonus crysoleucas), chain pickerel (Esox niger), black crappie (Pomoxis nigromaculatus) and creek chubsucker (Erimyzon oblongus). Using angling, a total of 35 fish were collected. The most prevalent fish species was yellow perch (Perca flavescens). Other species present were black crappie (Pomoxis nigromaculatus) and bluegill (Lepomis macrochirus). Using a barge electroshocker the following species were collected: golden shiner (Notemigonus crysoleucas), yellow perch (Perca flavescens), black crappie (Pomoxis nigromaculatus), and chain pickerel (Esox niger).

Minott Pond South

Fish population sampling was conducted by MA DFWELE at the north end of South Minot Pond/Westminster on 30 August 2000. Both gillnet and angling techniques were used. With gillnetting the following species were collected: golden shiner (Notemigonus crysoleucas), yellow perch (Perca flavescens), white sucker (Catostomus commersoni), chain pickerel (Esox niger), and pumpkinseed (Lepomis gibbosus). Pumpkinseed (Lepomis gibbosus) and chain pickerel (Esox niger) were collected by angling.

Lake Rohunta (Middle Basin)

MA DFWELE conducted fish population sampling in the Middle Basin of Lake Rohunta/Orange by boat shocking on 11 August 2000. Largemouth bass (Micropterus salmoides) and golden shiner (Notemigonus crysoleucas) were the dominant species collected. Other fish species present, in order of abundance, included: bluegill (Lepomis macrochirus), yellow perch (Perca flavescens), chain pickerel (Esox niger), black crappie (Pomoxis nigromaculatus), white sucker (Catostomus commersoni), and pumpkinseed (Lepomis gibbosus).

White Pond

White Pond in Athol was sampled by MA DFWELE using both gillnetting and angling on 28 July 2000. The fish population sample from angling was dominated by bluegill (Lepomis macrochirus). Other species present included: yellow perch (Perca flavescens), pumpkinseed (Lepomis gibbosus), black crappie (Pomoxis nigromaculatus), and largemouth bass (Micropterus salmoides). Using gillnetting the dominant species was chain pickerel (Esox niger). Other fish species that were collected included: white sucker (Catostomus commersoni), largemouth bass (Micropterus salmoides), yellow perch (Perca flavescens), brown bullhead (Ameiurus nebulosus), and black crappie (Promoxis nigromaculatus).

Tully Lake

On 12 September 2000 MA DFWELE conducted fish population sampling on Tully Lake in Royalston. A total of 220 fish were collected using boat shocking. The most dominant species was yellow perch (Perca flavescens), followed by largemouth bass (Micropterus salmoides), bluegill (Lepomis macrochirus), pumpkinseed (Lepomis gibbosus), and chain pickerel (Esox niger). Other species present included: black crappie (Pomoxis nigromaculatus), golden shiner (Notemigonus crysoleucas) and creek chubsucker (Erimyzon oblongus).

Snake Pond

Fish population sampling was conducted by MA DFWELE on Snake Pond in Gardner on 15 August 2000. Yellow perch (Perca flavescens) was the dominant species collected by gillnetting while largemouth bass (Micropterus salmoides) was the dominant species collected by angling. Other species present included pumpkinseed (Lepomis gibbosus) and chain pickerel (Esox niger).

Martin Lake

Yellow perch (Perca flavescens) was the dominant fish species found in Martin Lake/Winchendon in sampling conducted by MA DFWELE. Both angling and gillnetting were used to collect fish on 17 July 2000.

Chemistry – tissue

Beaver Flowage Pond (Beaver Pond)

A total of four fish were collected from this pond in September 1999. These included a 4-year old brown bullhead and three yellow perch (two of which were estimated as 9-year olds and one was not aged). The total PCB concentrations in the "whole fish" samples of these fish ranged from 47 to 214 ppb wet weight (ENSR 2000). None of these "whole fish" samples had levels of total PCB that exceeded the NAS/NAE guideline for total PCB (Coles 1998) of 500 ppb wet weight for the protection of fish-eating wildlife.

Lake Denison

A total of three fish were collected from this pond in October 1999. These included a 7-year old yellow perch and two 5-year old largemouth bass. The total PCB concentrations in the "whole fish" samples of these fish ranged from 227 to 1,245 ppb wet weight (ENSR 2000). Both of the largemouth bass samples had levels of total PCB that exceeded (2.0 and 2.5 times) the NAS/NAE guideline for total PCB (Coles 1998) of 500 ppb wet weight for the protection of fish-eating wildlife.

Chemistry-water
Oxygen depletion occurred below 1.0 m in September 2000 in both Whitney and Stoddard ponds (Appendix B, Table B2). However, it is suspected that these ponds are highly influenced by wetland drainage as evidenced by high color values and low pH and alkalinity and, therefore, these low dissolved oxygen conditions may be naturally occurring. The total phosphorus concentrations were moderately high and the deep-water samples show evidence of phosphorus release due to the anoxic conditions in Whitney Pond. Total phosphorus concentrations were low to moderately high in Stoddard Pond. Despite these results, there are too little data (some data were censored) to assess the status of the Aquatic Life Uses for either of these ponds. Because oxygen depletion occurs at such shallow depth, however, this use is identified with an Alert Status for both ponds. Additional data/information needs to be researched to determine if these conditions are naturally occurring or anthropogenically induced.

Chemistry-sediment
Surficial sediment sampling was conducted at two lakes (Beaver Flowage Pond in Royalston and Lake Denison in Winchendon) in August 1999. Sediment samples were collected from three stations at each waterbody and analyzed for PCBs. None of the samples had detectable levels of PCBs (ENSR 2000).

The Aquatic Life Use was assessed as impaired in eight lakes (including the three basins of Lake Rohunta) based on the confirmed presence of non-native macrophyte(s) representing a total of 808.9 acres (Table 5). While Stoddard and Whitney ponds in Winchendon were not assessed for the Aquatic Life Use the use was identified with an Alert Status because of oxygen depletion at shallow depth and slight to moderately elevated phosphorus concentrations (Appendix B, Table B2). Crystal Lake in Gardner was not assessed for this use but was identified with an Alert Status because of elevated aluminum concentrations in the Gardner Water Treatment Facility discharge. Because of elevated PCB levels in “whole fish” samples the Aquatic Life Use for Lake Denison is identified with an Alert Status (Table 5). The Aquatic Life Use is also identified with an Alert Status in Sunset Lake since there is an unconfirmed report of a non-native species (Myriophyllum heterophyllum). The remaining 57 lakes, representing 3,185.1 acres, in the Millers River Watershed were not assessed for the Aquatic Life Use because of the cursory nature of the 1995 synoptic surveys and/or the lack of dissolved oxygen data and other more recent observations.

FISH CONSUMPTION
In July 2001 MA DPH issued new consumer advisories on fish consumption and mercury contamination. The MA DPH “…is advising pregnant women, women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age to refrain from eating the following marine fish; shark, swordfish, king mackerel, tuna steak and tilefish. In addition, MA DPH is expanding its previously issued statewide fish consumption advisory which cautioned pregnant women to avoid eating fish from all freshwater bodies due to concerns about mercury contamination, to now include women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age (MA DPH 2001).” Additionally, MA DPH “…is recommending that pregnant women, women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age limit their consumption of fish not covered by existing advisories to no more than 12 ounces (or about 2 meals) of cooked or uncooked fish per week. This recommendation includes canned tuna, the consumption of which should be limited to two (2) cans per week. Very small children, including toddlers, should eat less. Consumers may wish to choose to eat light tuna rather than white or chunk white tuna, the latter of which may have higher levels of mercury (MA DPH 2001).” MA DPH’s statewide advisory does not include fish stocked by the state Division of Fisheries and Wildlife or farm-raised fish sold commercially. The advisory encompasses all freshwaters in Massachusetts and, therefore, the Fish Consumption Use for lakes in the Millers River Basin cannot be assessed as support.

Fish from a total of six lakes in the Millers River Basin were sampled in either 1994 or 1995 as part of a research and development study on mercury contamination developed by the Department’s Office of Research and Standards (ORS). The lakes included Upper Naukeag Lake (Ashburnham), Hilchey Pond (Gardner), Sheomet Lake (Warwick), Upper Reservoir (Westminster), Laurel Lake (Erving/Warwick), and Gales Pond (Warwick). Fish toxics monitoring (metals, PCB, and organochlorine pesticide in edible fillets) was conducted by DWM in Lake Rohunta (Athol/New Salem/Orange) in July 1995 and in Lake Denison (Winchendon) in August 1995 and again in June 1996. These data can be found in Appendix A, Table 14. Upper Reservoir (Westminster) was sampled again in 2001 and 2002 as part of a seasonal ORS study of mercury. Mercury concentrations in largemouth bass and yellow perch all exceeded the MA DPH action level. Upper Reservoir will continue to be sampled as part of an ongoing long-term study being conducted by DEP ORS.

Fish from two lakes, Beaver Flowage Pond and Lake Denison, were sampled in 1999 (September and October, respectively) as part of a site assessment and risk characterization of PCBs at Birch Hill Reservoir (ENSR 2000). The concentration of total PCB in four individual fish fillet samples (one brown bullhead and three yellow perch) from Beaver Flowage Pond ranged from 0.001 to

0.004 ppm wet weight. The concentration of total PCB in three individual fish fillet samples (one yellow perch and two largemouth bass) from Lake Denison ranged from 0.051 to 0.161 ppm wet weight (ENSR 2000).

The most recent MA DPH Fish Consumption List recommends the following for lakes in the Millers River Watershed (MA DPH 2002a).
Lake Denison (Winchendon) because of mercury.
1. "Children younger than 12 years, pregnant women, and nursing mothers should not eat any largemouth bass from this waterbody."
2. "The general public should limit consumption of largemouth bass from this waterbody to two meals per month."
Lake Rohunta - north, middle, south basins (Athol, New Salem, Orange) because of mercury.
1. "Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from this water body."
2. "The general public should limit consumption of all fish from this water body to two meals per month."
Gales Pond (Warwick) because of mercury.
1. "Children younger than 12 years, pregnant women, and nursing mothers should not eat any yellow perch from this waterbody."
2. "The general public should limit consumption of yellow perch from this waterbody to two meals per month."
Upper Naukeag Lake (Ashburnham) because of mercury.
1. "Children younger than 12 years, pregnant women, and nursing mothers should not eat any small mouth bass or yellow perch from this waterbody."
2. "The general public should limit consumption of small mouth bass or yellow perch from this waterbody to two meals per month."
Upper Reservoir (Westminster) because of mercury.
1. "Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from this water body."
2. "The general public should limit consumption of all fish from this water body to two meals per month."
Additionally, the Millers River advisory is also in place and covers Whitney Pond (all towns from Erving to Winchendon) because of mercury and PCBs.
1. "Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from this waterbody and its tributaries."
2. "The general public should not consume any brown trout or American eel taken from this waterbody downstream from its confluence with the Otter River."
3. "The general public should limit consumption of all non-affected fish from this waterbody and its tributaries to two meals per month."

Eight lakes (including the above mentioned six lakes plus the other two basins of Lake Rohunta), representing a total of 956 acres, are assessed as impaired (due to mercury contamination) for the Fish Consumption Use (Table 5). The remaining 57 lakes, representing 3,038 acres, are not assessed for the Fish Consumption Use. It should be noted, however, that the Fish Consumption Use for Lake Monomonac is identified with an Alert Status because of elevated levels of mercury in fish were reported by the NH DES (NH DES 2003). [NOTE: The MA DPH fish consumption advisory list contains the status of each water body for which an advisory has been issued. If a water body is not on the list it may be because either an advisory was not warranted or the water body has not been sampled. MA DPH's most current Fish Consumption Advisory list is available online at http://www.state.ma.us/dph/beha/fishlist.htm.] The source of mercury is unknown although atmospheric deposition is suspected.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS
In 1995 DWM conducted synoptic surveys of 64 lakes in the Millers River Watershed. These surveys included general observations of water quality and quantity, the presence of native and non-native aquatic plants (and presence/severity of algal blooms (Appendix B, Table B1). Additional data were collected in two of these lakes by DWM in 2000 for the purpose of TMDL development. These data, combined with the 1998 303(d) List of Waters, MA DEM and public bathing beach bacteria data, MA DPH beach posting data and diagnostic/feasibility studies were used to assess the recreational and aesthetics uses.

Bacteria samples were collected at the following MA DEM beaches: Dunn Pond State Park in Gardner, Ruggles Pond in the Wendell State Forest in Wendell, Laurel Lake in the Erving State Forest in Erving/Warwick, Beamans Pond in the Otter River State Forest in Templeton/Winchendon and the Lake Denison Recreational Area in the Otter River State Park in Winchendon. With the exception of Beamans Pond none of these beaches were reported closed or posted during the 2001 or 2002 swimming season. Although it is not a named segment in this report Beamans Pond campground beach at Otter River State Forest was closed due to elevated bacteria counts between 9 and 12 July 2001. The beach was also closed between 28 and 31 May 2002 due to elevated bacteria counts (MA DPH 2001 and 2002).

Bacteria samples were collected from two town bathing beaches during the summer of 2000 and 2001 (Kendall Pond in Gardner and Lake Mattawa in Orange), however, no quality assurance data were available. Elevated fecal coliform bacteria counts were reported from Kendall Pond (City of Gardner 2002), however, no postings were reported. Due to the elevated bacteria levels detected in Kendall Pond, the Primary Contact Recreational Use is identified with an Alert Status. It should be noted, however, that a sanitary sewer project was completed in 1999 for sewering the homes around Kendall Pond (Asen 2003). A total of eight fecal coliform bacteria samples were collected from Lake Mattawa between June and September 2000. None of the counts exceeded 150 cfu/100mls and no beach closures have been reported (Town of Orange 2002). It should also be noted that the beach at Silver Lake in Athol (not a segment in this report) was closed between 2 and 9 July 2001 because of elevated bacteria counts.

The Primary and Secondary Contact Recreational and Aesthetic uses were assessed as support in five lakes (Dunn Pond, Lake Denison, Lake Mattawa, Laurel Lake, and Ruggles Pond), representing a total of 282 acres (Table 5). The Primary and Secondary Contact Recreational and Aesthetics uses are not assessed in the remaining 60 lakes (3,712 acres) in the Millers River Watershed because of a lack of bacteria, transparency and in-lake survey data.

SUMMARY
A total of 13 of the 65 lakes in the Millers River Watershed assessed in this report were impaired for either the Aquatic Life Use and/or the Fish Consumption Use (Table 5). Causes of impairment included non-native plant infestation and mercury contamination. Eight lakes, totaling 956 acres, were impaired for the Fish Consumption Use due to mercury contamination. Five lakes, totaling 282 acres, supported the Primary and Secondary Contact Recreational and Aesthetics uses. A total of 48 lakes (1,581.9 out of 3,994 acres) were not assessed for any uses.

Due to the focus of the lake surveys (synoptic surveys and surveys conducted for the TMDL program) the major cause for use impairment was non-native aquatic vegetation. Mercury contamination was also a cause for impairment. Beach closure information from MA DEM and town beaches was used to assess the recreational and aesthetics uses for the Millers River Watershed.

TMDL survey conducted in 2000 and synoptic survey in 1995 (Appendix B, Tables B1, B2, and B3). This pond had low dissolved oxygen/saturation at depths below 1.0m, low pH and alkalinity, and high color (Appendix B, Tables B2 and B3). These data are likely indicative of natural conditions associated with the wetlands upstream. While there are moderate levels of total phosphorus at the surface (concentrations ranging between 0.034 to 0.045 mg/L) and high concentrations near the lake bottom (ranging from 0.057 to 0.092 mg/L) they did not result in high lake productivity (i.e., low to moderate chlorophyll a concentrations). Biovolume density was estimated as 37% dense/very dense cover and no non-native aquatic plants were identified (Appendix B, Table B1). The Aquatic Life Use is identified with an “Alert Status”, however because it is undetermined if the phosphorus concentrations were elevated as a result of anthropogenic sources. The MRPC and FRCOG (2002) study noted stormwater concern along High Street. Additionally, the Winchendon Country Club with a golf course is in close proximity. Fish toxics monitoring was conducted by MA DEP in Whitney Pond in 1987 (Austin et al. 1990). Mercury exceeded the MA DPH action level of 0.5 mg/Kg. The current MA DPH advisory for the Millers River (all towns from Erving to Winchendon, which includes Whitney Pond) recommends “Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from this waterbody and its tributaries, the general public should not consume any brown trout or American eel taken from this waterbody downstream from its confluence with the Otter River, and the general public should limit consumption of all non-affected fish from this waterbody and its tributaries to two meals per month” because of mercury and PCBs. However, PCB levels in fish from Whitney Pond did not exceed the MA DPH action level of 1.0 mg/Kg. The MA DPH is currently in the process of reevaluating the advisory for the Millers River Watershed. The Fish Consumption Use is assessed as impaired because of the existing site-specific advisory, however, the cause of impairment is limited to mercury. The Secchi disc depths ranged from 1.2 to 1.5 m (just meeting the bathing beach guidelines), however, it is best professional judgment that these conditions are naturally occurring (a result of the highly colored water). No fecal coliform bacteria data are currently available and, therefore, the Primary and Secondary Contact Recreational uses are currently not assessed. The Aesthetics Use is currently not assessed, however, the presence of a non-native wetlands species (Lythrum salicaria) was identified. Whitney Pond is on the 1998 303(d) List of Waters because of metals, noxious aquatic plants, and turbidity (Table 3). The TMDL of Phosphorus for this pond is to be reduced from the current estimated loading of 1918 kg/year to a target load of 1552 kg/year (19% reduction) (MA DEP 2002). Fish toxics monitoring was conducted in this pond in 1987 (Maietta 1988).

Report Recommendations:
RECOMMENDATIONS – LAKES

• Careful consideration should be given to WMA permits for the Ashburnham and Winchendon Water Departments since Upper Naukeag Lake was identified at a high stress level based on water quantity (Gomez and Sullivan 2003). Furthermore, some of the water withdrawn from Upper Naukeag Lake is transferred out of the upper Millers River subwatershed to the Otter River subwatershed, the Middle River subwatershed, and the Nashua River Basin.

• MPDH is currently reevaluating their Fish Consumption Advisory for the Millers River Watershed. MA DEP has recommended that a site-specific advisory be issued for Whitney Pond because of elevated mercury. Additional fish toxics monitoring in the lakes in the Upper Millers River and North Branch Millers River subwatersheds should be conducted (Sunset Lake, Lower Naukeag, Lake Monomonac, Lake Watatic, and Wallace Pond).

• Confirm the presence of Myriophyllum heterophyllum, which is suspected to occur in Sunset Lake (Ashburnham/Winchendon).

• Coordinate with MA DCR and/or other groups conducting lake surveys to generate quality assured lakes data. Conduct more intensive lake surveys to better determine the lake trophic and use support status and identify causes and sources of impairment. As sources are identified within lake watersheds they should be eliminated or, at least, minimized through the application of appropriate point or non-point source control techniques.

• Implement recommendations identified in the TMDLs and lake diagnostic/feasibility studies, including lake watershed surveys to identify sources of impairment. Specific recommendations from the TMDL study include the following:
 Bourn-Hadley Pond has an unregulated sand and gravel operation on the western shore. This site should be investigated to ensure that best management practices are being utilized and that it is in compliance with the Wetlands Protection Act.
 Lake Ellis has initiated a program to treat the lake with herbicides that have been effective in controlling the plants in the lake. Designated use zoning is recommended to target areas for plant control.
 South Athol Pond has a gravel operation on the eastern shore that should be investigated to ensure that best management practices are being utilized so that water quality is protected.

• In-lake management of rooted aquatic plants is recommended for the following recreational lakes that have public access and are deep enough to offer recreational opportunities such as swimming and boating: Lake Ellis, Lower Naukeag Lake, Lake Monomonac, Parker Pond and Whitney Pond. Designated use zoning is recommended to target areas for plant control (MA DEP 2002).

• Continue to review data from "Beaches Bill" required water quality testing (bacteria sampling at all formal bathing beaches) to assess the status of the recreational uses.

• Quick action is necessary to manage non-native aquatic or wetland plant species that are isolated in one or a few location(s), in order to alleviate the need for costly and potentially fruitless efforts to do so in the future. Two courses of action should be pursued concurrently. More extensive surveys need to be conducted, particularly downstream from these recorded locations to determine the extent of the infestation. And, "spot" treatments (refer to the draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts [Mattson et al. 2004] for advantages and disadvantages of each) should be undertaken to control populations at these sites. These treatments include careful hand-pulling of individual plants in small areas. In larger areas other techniques, such as selective herbicide application, may be necessary. In either case, the treatments should be undertaken prior to fruit formation and with a minimum of fragmentation of the individual plants. These actions will minimize the spreading of the populations. This draft aquatic plant report (Mattson et al. 2004) should be consulted prior to the development of any lake management plan to control non-native aquatic or wetland plant species.

• Where non-native plant infestations are more extensive, conduct additional monitoring to determine the extent of the problem. The draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson et al. 2004) should be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should be discouraged because of the propensity for some invasive species of these plants to reproduce and spread vegetatively (from cuttings).

• Prevent spreading of invasive plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and responsibility of spreading these species.

• Review the MA DEP Drinking Water Program Source Water Assessment Program evaluations are when they are completed to develop and implement recommendations for the protection of Class A lakes in the Millers River Basin including Upper Naukeag Lake, Crystal Lake, Cowee Pond and Perley Brook Reservoir.

Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

(MA35101 - Whitney Pond)

Whitney Pond in Winchendon is a large pond of approximately 97 acres formed by a 21 foot high dam on the Millers River. The maximum depth is 5.6m (or 18 feet). As such the lake is estimated to have an average residence time of approximately 7 days. The dominant landuses in the watershed are 87 percent forest, followed by 7 percent water and 3 percent agricultural landuse. The rest of the watershed consists of urban landuse. The Winchendon Country Club Golf Course is located near the pond. A DEP baseline survey during June 1987 showed high total phosphorus in Whitney Pond and the assessment comments from 1994 reported: " Historically high total phosphorus levels and low hypolimnetic dissolved oxygen (3 to 5 meters), but these data are too old to use for making adequate assessments. Historically dense growths of aquatic macrophytes covered the entire littoral zone and fishing advisory due to mercury in fish tissue; these factors used to make current assessment." Data from a 3 month baseline survey conducted by DEP/MDFW during the summer of 2000 showed the pond does stratify and oxygen is nearly absent below 2.5 m. Very dense native macrophytes covered about one half of the pond area with open water in the center. The average total phosphorus at the surface was 0.037mg/l. The average Secchi disk transparency ranged from 1.2 to 1.5 meters (average 1.3) but some of this low transparency was probably due to high levels of natural color that averaged 190 PCU. The chlorophyll a ranged between <1 and 4.3 ug/l. The Carlson trophic index of 51 indicates a eutrophic lake, with some indication of reduction in transparency due to natural color. A site visit in September of 2002 by DEP staff noted the pond had fairly transparent water but also noted evidence of people feeding bread to the ducks and geese on the pond.

No detailed study of the nutrient sources within the lake watersheds has been conducted to date. Thus, nutrient sources were estimated based on land use modeling within the DEP's NPSLAKE model. The NPSLAKE model was designed to estimate watershed loading rates of phosphorus to lakes. The phosphorus loading estimates from the model are used with estimates of water runoff and these are used as inputs into a water quality model of Reckhow (1979). A brief description of the NPSLAKE model and data inputs is given here. MassGIS digital maps of land use (1985 or 1999 when available) within the watershed were used to calculate areas of landuse within three major types: Forest, rural and urban landuse. This model takes the area in hectares of land use within each of three categories and applies an export coefficient to each to predict the annual external loading of phosphorus to the lake from the watershed. Because some of the landuse data is based on old (1985) aerial photographs, the current landuses within the watershed may be different today. This can be important in the development of the TMDL because different landuses can result in different phosphorus loadings to the waterbody in question. For many rural areas, landuse changes often result in conversion of open or agricultural lands to low density housing, in which case, the export coefficients of the NPSLAKE model are the same and no change in loading is predicted to occur. However, in cases where development changes forests to residential areas or rural landuses to urban landuses, phosphorus loadings are predicted to increase. In some cases, loadings are predicted to decrease if additional agricultural land is abandoned and forest regrowth occurs. To account for this uncertainty in landuse changes, a conservative target is chosen. In addition, the MassGIS landuse maps are scheduled to be updated with current aerial photos and the TMDL can be modified as additional information is obtained.

Other phosphorus sources, such as septic system inputs of phosphorus, are estimated from an export coefficient multiplied by the number of homes within 100 meters of the lake. Point sources are estimated manually based on discharge information and site specific information for uptake and storage. Other sources such as atmospheric deposition to lakes was determined to be small and not significant in the NPSLAKE model, perhaps because lakes tend to be sinks rather than sources of phosphorus. For similar reasons, wetlands were also not considered to be significant sources of phosphorus following. Other, non-landuse sources of phosphorus such as inputs from waterfowl were generally not included, but can be added as additional information becomes available. If large numbers of waterfowl are using the lake the total phosphorus budget may be an underestimate, and control measures should be considered.

An internal source (recycling) of phosphorus is not included because it is not considered as a net external load to the lake, but rather a seasonal recycling of phosphorus already present in the lake. In cases where this internal source is large it may result in surface concentrations higher than predicted from landuse loading models and may contribute to water quality violations during the critical summer period. As additional monitoring data become available, these lakes will be assessed for internal contributions and possibly control of these sources by alum or other means. The major sources according to the land use analysis are shown in the table below (from “Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes”, 2003).

Table   Whitney Pond MA35101

Total Estimated Pollution loads based on GIS Landuse

Watershed Area=	13517.7 Ha (52.2 mi2)
Average Annual Water Load =	82404328.9 m3/yr (93.3 cfs)
Average Runoff=	61.0 cm/yr (24.0 in/yr)
Lake area=	41.0 Ha. (101.3ac)
Areal water loading to lake: q=	201.0 m/yr.
Homes with septic systems within 100m of lake.=	0.0
Other P inputs =	0.0 kg/yr

Estimate of annual Nonpoint Source Pollution Loads by land use

Land use	Area Ha (%)	P Load kg/yr (%)	N Load kg/yr	TSS Load kg/yr
Forest category				
Forest:	11750.8 (86.9)	1527.6 (79.7)	29377.0	282019.2
Rural category				
Agriculture:	386.7 (2.9)	116.0 (6.1)	4833.9	178273.6
Open land:	12.5 (0.1)	3.8 (0.2)	65.1	187.8
Residential Low:	0.0 (0.0)	0.0 (0.0)	0.0	0.0
Other Landuses				
Water:	996.6 (7.4)	0.0 (0.0)	0.0	0.0
Wetlands:	0.0 (0.0)	0.0 (0.0)	0.0	0.0
Other P inputs:	NA	0.0 (0.0)		
0.0 Septics:	NA	0.0 (0.0)		
Urban category				
Residential High:	266.6 (2.0)	193.8 (10.1)	1466.4	124241.9
Comm - Ind:	104.5 (0.8)	75.9 (4.0)	1041.4	70499.8
Total	13517.7 (100.0)	1917.1(100)	36783.8	655222.3

Summary of Lake Total Phosphorus Modeling Results

Areal P loading L= 4.7 g/m2/yr.
Reckhow (1979) model predicts lake TP = L/(11.6+1.2q)*1000 = 18.5 ppb.
Predicted transparency = 2.6 meters.

The NPSLAKE model assumes land uses are accurately represented by the MassGIS digital maps and that land use has not changed appreciably since the maps were compiled in 1985. The predicted loading is based on the equation:

P Loading (kg/yr)= 0.5* septics + 0.13* forest ha + 0.3* rural ha + 14* (urban ha)^0.5

The coefficients of the model are based on a combination of values estimated with the aid of multiple regression on a Massachusetts data set and of typical values reported in previous diagnostic/feasibility studies in Massachusetts. All coefficients fall within the range of values reported in other studies. The overall standard error of the model is approximately 172 kg/yr. If no data is available for internal loading a rough estimate of the magnitude of this source can be estimated from the Reckhow model by substitution of the in-lake concentration for TP. The difference in predicted loadings from this approach and the landuse approach is the best estimate of internal loading.

The NPSLAKE model also generates predictions of estimated yearly average water runoff to the lake based on total watershed area and runoff maps of Massachusetts. Other estimates of nitrogen and total suspended solids (TSS) loading rates are provided here for informational and comparison purposes only.

Because of the general nature of the landuse loading approach, natural background is included in land use based export coefficients. Natural background can be estimated based on the forest export coefficient of 0.13 kg/ha/yr multiplied by the hectares of the watershed assuming the watershed to be entirely forested. Without site specific information regarding soil phosphorus and natural erosion rates the accuracy of this estimate would be uncertain and would add little value to the analysis.

A recent report on nonpoint source pollution in the Millers basin used slightly different phosphorus coefficients based on the EPA Nationwide Urban Runoff Program (NURP) to estimate loads to several of the lakes (MRPC & FRCG, 2002). Although the two estimates are correlated there is no consistent difference (bias) between the models. The nonlinear Urban landuse loading coefficient used in NPSLAKE may explain some of the variation between the models. Because the NPSLAKE model has been verified against measured loads to lakes, the NPSLAKE loads will be used as a basis for these TMDLs.

MRPC & FRCG. 2002. Assessment of Potential Nonpoint Source Pollution for the Millers River Watershed in Massachusetts. Montachusett Regional Planning Agency, Fitchburg, MA and Franklin Regional Council of Governments, Greenfield, MA. Mass DEP and US EPA.
Reckhow, K.H. 1979. Uncertainty Analysis Applied to Vollenweider's Phosphorus Loading Criteria. J. Water Poll. Control Fed. 51(8):2123-2128.

Literature review information:

3. Water Quality Impairments

Known water quality impairments, as documented in the Massachusetts Department of Environmental Protection (MassDEP) 2012 Massachusetts Integrated List of Waters, are listed below. Impairment categories from the Integrated List are as follows:

Table A-2: 2012 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.

Table A-3: Water Quality Impairments

Assessment Unit ID	Waterbody	Integrated List Category	Designated Use	Impairment Cause	Impairment Source
MA35101	**Whitney Pond**	**5**	Aesthetic	Aquatic Plants (Macrophytes)	Source Unknown
MA35101	**Whitney Pond**	**5**	Aesthetic	Turbidity	Source Unknown
MA35101	**Whitney Pond**	**5**	Fish Consumption	Mercury in Fish Tissue	Source Unknown
MA35101	**Whitney Pond**	**5**	Primary Contact Recreation	Aquatic Plants (Macrophytes)	Source Unknown
MA35101	**Whitney Pond**	**5**	Primary Contact Recreation	Turbidity	Source Unknown
MA35101	**Whitney Pond**	**5**	Secondary Contact Recreation	Aquatic Plants (Macrophytes)	Source Unknown
MA35101	**Whitney Pond**	**5**	Secondary Contact Recreation	Turbidity	Source Unknown

4. 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. WhitneyPond is a Class 'B' waterbody. The water quality goal for fecal coliform bacteria is based on the Massachusetts Surface Water Quality Standards.

Table A-4: Surface Water Quality Classification by Assessment Unit ID

Assessment Unit ID	Waterbody	Class
MA35101	Whitney Pond	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.).

Table A-5: Water Quality Goals

Pollutant	Goal	Source
Total Phosphorus (TP)	The target in-lake total phosphorus concentration chosen is based on consideration of the typical concentrations expected in lakes in the region. The phosphorus ecoregion map of Griffith et al. (1994) is based on spring/fall concentrations, while the phosphorus ecoregion map of Rohm et al., (1995) is based on summer concentrations. The following table (from “Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes”, 2003) shows the ecoregion expected TP concentrations for both spring and summer, and the target TP that was chosen for each lake in the Millers watershed. The TP predicted by the NPSLAKE model of DEP and the surface TP concentrations are also shown for comparison. Note that according to the Carlson Trophic State analysis (Carlson,1977) a lake should have total phosphorus concentrations of about 40 ppb to meet the 4-foot transparency requirement for swimming beaches in Massachusetts. The target should be set lower than this to allow for a margin of safety. The lower phosphorus concentrations will lessen the chance of nuisance algal blooms, which may occur as macrophyte biomass is reduced by direct controls.	Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

WBID	Lake Name	TP (ppb) range in Griffith ecoregion	TP (ppb) range in Rohm ecoregion	NPSLAKE Predicted TP (ppb)	*Surface TP data (ppb)	Selected Target TP (ppb)
MA35005	Beaver Pond	5-9	15-19	12.5	NA	12.5
MA35007	Bents Pond	5-9	15-19	33.5	60	15
MA35008	Bourn-Hadley	5-9	15-19	31.1	NA	15
MA35010	Brazell Pond	5-9	15-19	42.1	NA	15
MA35013	Cowee Pond	5-9	15-19	12.7	NA	12.7
MA35015	Davenport Pond	5-9	15-19	12.7	60	12.7
MA35017	Lake Denison	5-9	15-19	20.1	32	15
MA35018	Depot Pond	5-9	15-19	32.2	NA	15
MA35023	Ellis Pond	5-9	15-19	17.5	50	15
MA35025	Greenwood Pond 1	5-9	15-19	13.9	NA	13.9
MA35026	Greenwood Pond 2	5-9	15-19	35.5	NA	15
MA35029	Hilchey Pond	5-9	15-19	27.4	NA	19
MA35041	Lower Naukeag	5-9	15-19	14.5	20	14.5
MA35045	Minott Pond South	5-9	15-19	11.0	NA	11.0
MA35046	Minott Pond	5-9	15-19	16.6	NA	15
MA35047	Lake Monomonac	5-9	15-19	13.3	14	13.3
MA35056	Parker Pond	5-9	15-19	30.0	NA	15
MA35062	Ramsdall Pond	5-9	15-19	32.4	NA	15
MA35063	Reservoir No. 1	5-9	15-19	21.1	NA	15
MA35064	Reservoir No. 2	5-9	15-19	5.1	NA	5.1
MA35065	Riceville Pond	5-9	15-19	15.1	NA	15
MA35078	South Athol Pond	5-9	15-19	17.5	20	15
MA35083	Stoddard Pond	5-9	15-19	21.1	25	15
MA35092	Wallace Pond	5-9	15-19	13.7	NA	13.7
MA35093	Ward Pond	5-9	15-19	15.4	50	15
MA35099	Whites Mill Pond	5-9	15-19	19.8	NA	15
MA35101	Whitney Pond	5-9	15-19	18.5	37	15
MA35104	Wrights Reservoir	5-9	15-19	13.5	60	13.5

NA=Not Available

Shallow nutrient rich sediments offer an ideal habitat for natural growth of aquatic macrophytes, which provide habitat for fish and wildlife and as such complete elimination of macrophytes is neither possible nor desired. In many cases, the proliferation of aquatic macrophytes in the pond is a natural condition resulting from nutrient rich riparian soils being flooded when streams and lakes were dammed for hydropower. Thus reducing the supply of external phosphorus may not meet the goals of the TMDL without additional management in the lake.

For the table, Griffith ecoregions are based on Griffith et al. (1994). Rohm ecoregions are based on Rohm et al., (1995). Latest surface total phosphorus concentrations are based on survey data. Note: Recent surveys in 2000 have total phosphorus methods which can detect low concentrations accurately with a method detection limit of 5 ppb. The remaining early (pre-1990) survey TP concentrations have a detection limit of approximately 50 ppb, and values reported for these lakes that are less than this detection limit are suspect.

In cases where the NPSLAKE model predicted current total phosphorus concentrations lower than

	the ecoregion targets, we chose to maintain the lower current total phosphorus concentrations as the final target. Lakes with higher TP than the model estimates may have unknown sources or internal sources of phosphorus. Carlson, R.E. 1977. A Trophic State Index for Lakes. Limnol. Oceanogr. 22(2):361-369. Griffith, G.E., J.M. Omernik, S.M. Pierson, and C.W. Kiilsgaard. 1994. Massachusetts Ecological Regions Project. USEPA Corvallis. Massachusetts DEP, DWM Publication No. 17587-74-70-6/94-D.E.P. Rohm, C.M., J.M. Omernik, and C.W. Kiilsgaard. 1995. Regional Patterns of Total Phosphorus in Lakes of the Northeastern United States. Lake and Reservoir Man. 11(1): 1-14.	
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)

Note: *There may be more than one water quality goal for bacteria due to different Massachusetts Surface Water Quality Standards Classes for different Assessment Units within the watershed.*

5. Land Use Information

A. Watershed Land Uses

Table A-6: Watershed Land Uses

Land Use	Area (acres)	% of Watershed
Agriculture	347.25	1.8
Commercial	94.87	0.5
Forest	16156.6	82.4
High Density Residential	99.97	0.5
Highway	3.1	0
Industrial	112.31	0.6
Low Density Residential	999.96	5.1
Medium Density Residential	215.87	1.1
Open Land	319.69	1.6
Water	1246.36	6.4

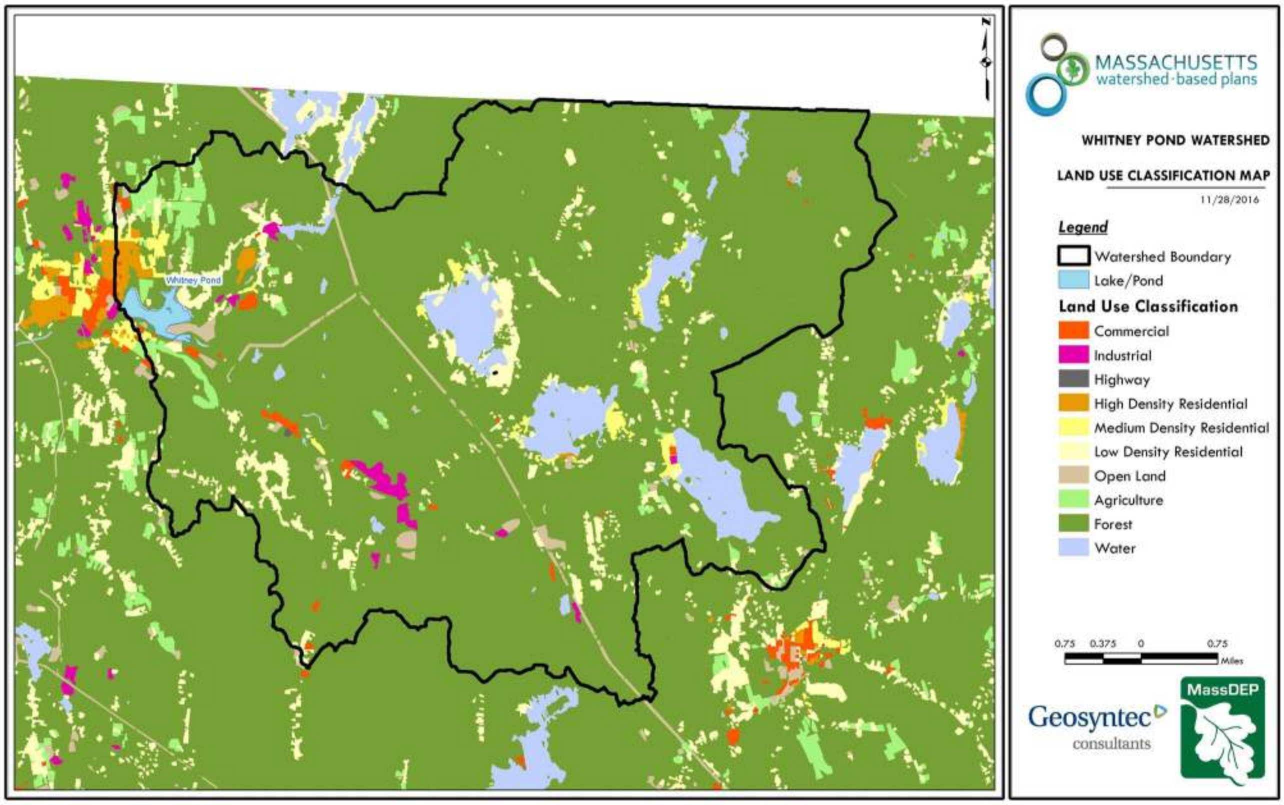

Figure A-2: Watershed Land Use Map (MassGIS, 2009b; MassGIS, 1999; MassGIS, 2001; USGS, 2016)

Ctrl + Click on the map to view a full sized image in your web browser.

B. 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 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 watershed 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.

Estimated TIA in the watershed: 3.3 %
Estimated DCIA in the watershed: 2.3 %

The relationship between TIA and water quality can generally be categorized as follows (Schueler et al. 2009):

Table A-7: 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.

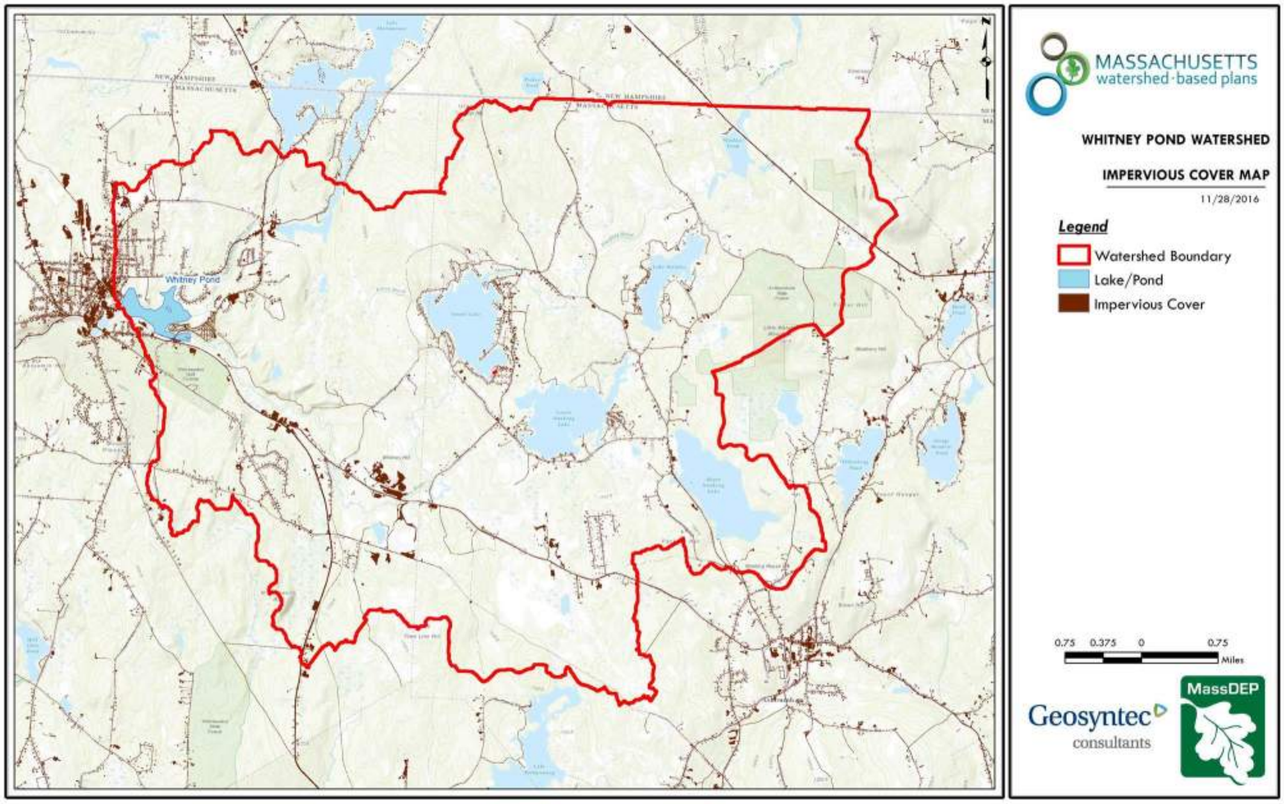

Figure A-3: Watershed Impervious Surface Map (MassGIS, 2009b; MassGIS, 1999; MassGIS, 2001; USGS, 2016)

Ctrl + Click on the map to view a full sized image in your web browser.

Land use information:

6. Pollutant Loading

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 watershed was estimated by multiplying each land use/cover type area by its pollutant load export rate (PLER). 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 (Voorhees, 2016b) (see documentation provided in Appendix A) 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)

Table A-8: Estimated Pollutant Loading for Key Nonpoint Source Pollutants

Land Use Type	Pollutant Loading[1]		
	Total Phosphorus (TP) (lbs/yr)	Total Nitrogen (TN) (lbs/yr)	Total Suspended Solids (TSS) (tons/yr)
Agriculture	165	983	13.03
Commercial	77	662	8.29
Forest	2,161	10,859	517.20
High Density Residential	70	496	7.21
Highway	1	13	0.59
Industrial	79	697	8.72
Low Density Residential	301	3,085	41.41
Medium Density Residential	73	685	9.19
Open Land	98	978	20.15
TOTAL	3,025	18,457	625.78

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

Pollutant loading information:

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.

1. Estimated Pollutant Loads

Table 1 lists estimated pollutant loads for the following primary nonpoint source (NPS) pollutants: total phosphorus (TP), total nitrogen (TN), total suspended solids (TSS). These estimated loads are based on the pollutant loading analysis presented in Section 4 of Element A.

2. Water Quality Goals

Water quality goals for primary NPS pollutants are listed in Table 1 based on the following:

- TMDL water quality goals (if a TMDL exists for the water body);
- For all water bodies, including impaired waters that have a pathogen 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.
- If the water body does not have a TMDL for TP, 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". Because there are no similar default water quality goals for TN and TSS, goals for these pollutants are provided in Table 1 only if a TMDL exists or alternate goal(s) have been optionally established by the WBP author.
- According to the USEPA Gold Book, total phosphorus should not exceed 50 ug/L in any stream at the point where it enters any lake or reservoir. The water quality loading goal was estimated by multiplying this target maximum phosphorus concentration (50 ug/L) by the estimated annual watershed discharge for the selected water body. To estimate the annual watershed discharge, the mean flow was used, which was estimated based on United States Geological Survey (USGS) "Runoff Depth" estimates for Massachusetts (Cohen and Randall, 1998). Cohen and Randall (1998) provide statewide estimates of annual Precipitation (P), Evapotranspiration (ET), and Runoff (R) depths for the northeastern U.S. According to their method, Runoff Depth (R) is defined as all water reaching a discharge point (including surface and groundwater), and is calculated by:

$$P - ET = R$$

A mean Runoff Depth R was determined for the watershed by calculating the average value of R within the watershed boundary. This method includes the following assumptions/limitations:

a. For lakes and ponds, the estimate of annual TP loading is averaged across the entire watershed. However, a given lake or reservoir may have multiple tributary streams, and each stream may drain land with vastly different characteristics. For example, one tributary may drain a highly developed residential area, while a second tributary may drain primarily forested and undeveloped land. In this case, one tributary may exhibit much higher phosphorus concentrations than the average of all streams in the selected watershed.

b. The estimated existing loading value only accounts for phosphorus due to stormwater runoff. Other sources of phosphorus may be relevant, particularly phosphorus from on-site wastewater treatment (septic systems) within close proximity to receiving waters. Phosphorus does not typically travel far within an aquifer, but in watersheds that are primarily unsewered, septic systems and other similar groundwater-related sources may contribute a significant load of phosphorus that is not captured in this analysis. As such, it is important to consider the estimated TP loading as "the expected TP loading from stormwater sources."

Table B-1: Pollutant Load Reductions Needed

Pollutant	Existing Estimated Total Load	Water Quality Goal	Required Load Reduction
Total Phosphorus	See TMDL information below	See TMDL information below	See TMDL information below
Total Nitrogen	18457 lbs/yr		
Total Suspended Solids	626 ton/yr		
Bacteria	*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.	

TMDL Pollutant Load Criteria

Total Phosphorus (MA35101)

Modeling Assumptions, Key Input, Calibration and Validation:

There are no numeric models available to predict the growth of rooted aquatic macrophytes as a function of nutrient loading estimates, therefore the control of nuisance aquatic plants is based on best professional judgment. However, as previously stated, the goal of the TMDL is to prevent future eutrophication from occurring, thus the nutrient loading still needs to be controlled. To control eutrophication, the Carlson Trophic State Index (TSI) (Carlson,1977) predicts a lake should have total phosphorus concentrations of about 40 ppb to meet the 4-foot transparency requirement for swimming beaches in Massachusetts and targets are set lower than this. Due to the lack of data on mean depth and other parameters, a simple water quality model was used to link watershed phosphorus loading to in-lake total phosphorus concentration targets. Based on the NPSLAKE model phosphorus loading output and predicted water runoff volumes, an estimated in-lake total phosphorus (TP) concentration was derived based on the Reckhow (1979) model:

$TP=L/(11.6+1.2*q)*1000$

where TP= the predicted average total phosphorus concentration (mg/l) in the lake.
L= Phosphorus loading in g/m2/yr (the total loading in grams divided by lake area in meters).
q= The areal water loading in m/yr from total water runoff in m3/yr divided by lake area in m2.

Similarly, by setting the TP to the target total phosphorus concentration, a target load was estimated by solving the equation above. As noted in Mattson and Isaac (1999) the Reckhow (1979) model was developed on similar, north temperate lakes and most Massachusetts lakes will fall within the range of phosphorus loading and hydrology of the calibration data set. Additional assumptions, and details of calibration and validation are given in Reckhow (1979).

Wasteload Allocations, Load Allocations and Margin of Safety:

For most lakes, point source wasteload allocation is zero since no point sources have been identified. For lakes with permitted point sources the loading is based on flow and concentrations reported in the DMR reports. The margin of safety is set by establishing a target that is below that expected to meet the 4-foot swimming standard (about 40 ppb). Thus, the TMDL is the same as the target load allocation to nonpoint sources as indicated in the right side of the following table (from “Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes”, 2003). Loading allocations are based on the NPSLAKE of DEP landuse modeled phosphorus budget. Note that some lakes have surface TP concentrations that are much larger than those predicted by the NPSLAKE. It is difficult to determine the cause of the discrepancy because only one data point was available for each lake and that one sample may not be representative of the lake. If further sampling confirms a discrepancy in these lakes, internal sources of phosphorus, such as the sediments, may also be a contributing source of phosphorus to the surface waters and should be considered for further evaluation and control.

Table . Whitney Pond MA35101 TMDL Load Allocation.

Source	*Current TP Loading (kg/yr)*	*Target TP Load Allocation (kg/yr)*
Load Allocation		
Forest	1528	1528
Agriculture	116	7
Open Land	4	0
Residential (Low den.)	0	0
Septic System	0	0
Other	0	0
Waste Load Allocation		
Comm. Indust.	76	5
Residential (High den.)	194	12
Total Inputs	1918	1552

Phosphorus loading allocations for each landuse category are shown (rounded to the nearest kg/yr) in the table. No reduction in forest loading is targeted, because other than logging operations, which are relatively rare and already have BMPs in place, this source is unlikely to be reduced by additional BMPs. The remaining load reductions are allocated as a proportional phosphorus loading reduction (except as noted below).

The TMDL is the sum of the wasteload allocations (WLA) from point sources (e.g., sewage treatment plants) plus load allocations (LA) from nonpoint sources (e.g., landuse sources) plus a margin of safety (MOS). Thus, the TMDL can be written as:

TMDL = WLA + LA + MOS

In some cases, such as Whites Mill Pond, some reduction in loading from the forest was required to attain the target TMDL. In the case of Whitney Pond the in-lake concentration was much higher than the NPSLAKE model predicted (0.037 mg/l vs. 0.018mg/l). This may be due to errors in the model and/or unmeasured sources of phosphorus to the lake such as internal sediment sources. Although there is a build up of high concentrations of phosphorus in the bottom waters in late summer (0.88 mg/l) it is unlikely this contributes to surface total phosphorus due to the quick flushing of water provided by the Millers River and the lack of any increase in surface TP during the summer. Thus an alum treatment is not warranted in this lake at this time. Further efforts should be put into controlling phosphorus inputs from the watershed. Although cold water (less than 20C or 68F) is present in the hypolimnion there is currently little or no dissolved oxygen present there to support trout during the summer.

Seasonality: As the term implies, TMDLs are often expressed as maximum daily loads. However, as specified in 40 CFR 130.2(I), TMDLs may be expressed in other terms when appropriate. For this case, the TMDL is expressed in terms of allowable annual loadings of phosphorus. Although critical conditions occur during the summer season when weed growth is more likely to interfere with uses, water quality in many lakes is generally not sensitive to daily or short term loading, but is more a function of loadings that occur over longer periods of time (e.g. annually).

Therefore, seasonal variation is taken into account with the estimation of annual loads. In addition, evaluating the effectiveness of nonpoint source controls can be more easily accomplished on an annual basis rather than a daily basis. For most lakes, it is appropriate and justifiable to express a nutrient TMDL in terms of allowable annual loadings. The annual load should inherently account for seasonal variations by being protective of the most sensitive time of year. The most sensitive time of year in most lakes occurs during summer, when the frequency and occurrence of nuisance algal blooms and macrophyte growth are usually greatest. Therefore, because the phosphorus TMDL was established to be protective of the most environmentally sensitive period (i.e., the summer season), it will also be protective of water quality during all other seasons. Additionally, the targeted reduction in the annual phosphorus load to lakes will result in the application of phosphorus controls that also address seasonal variation. For example, certain control practices such as stabilizing eroding drainage ways or maintaining septic systems will be in place throughout the year while others will be in effect during the times the sources are active (e.g., application of lawn fertilizer). In cases of rapidly flushing (less than 14 days) lakes or impoundments downstream of point sources it may be appropriate to set seasonal limits on phosphorus inputs based on the growing season (April-October). In such cases permit limits in the winter months could be relaxed (e.g. 1 mg/l total phosphorus), provided that permit limits on total suspended solids remain in effect.

Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

Pollutant load reduction information:

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.

Table C1 presents the proposed management measures as well as the estimated pollutant load reductions and costs. The planning level cost estimates and pollutant load reduction estimates and estimates of BMP footprint were based off information obtained in the following sources and were also adjusted to 2016 values using the Consumer Price Index (CPI) (United States Bureau of Labor Statistics, 2016):

- Geosyntec Consultants, Inc. (2014);
- Geosyntec Consultants, Inc. (2015);
- King and Hagen (2011);
- Leisenring, et al. (2014);
- King and Hagen (2011);
- MassDEP (2016a);
- MassDEP (2016b);
- University of Massachusetts, Amherst (2004);
- Voorhees (2015);
- Voorhees (2016a);
- Voorhees (2016b);

Table C-1: Proposed Management Measures, Estimated Pollutant Load Reductions and Costs

Structural BMPs
No Structural BMP Data Found

Additional BMPs
No Additional BMP Data Found

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.

Table D-1 presents the funding needed to implement the management measures presented in this watershed plan. The table includes costs for structural and non-structural BMPs, operation and maintenance activities, information/education measures, and monitoring/evaluation activities.

Table D-1: Summary of Funding Needed to Implement the Watershed Plan.

Management Measures	Location	Capital Costs	Operation & Maintenance Costs	Relevant Authorities	Technical Assistance Needed	Funding Needed
Structural and Non-Structural BMPs (from Element C)						
Information/Education (see Element E)						
Monitoring and Evaluation (see Element H/I)						
					Total Funding Needed:	
Funding Sources:						

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.

Step 1: Goals and Objectives

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

Step 2: Target Audience

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

Step 3: Outreach Products and Distribution

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

Step 4: Evaluate Information/Education Program

Information and education efforts and how they will be evaluated.

Other Information

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.

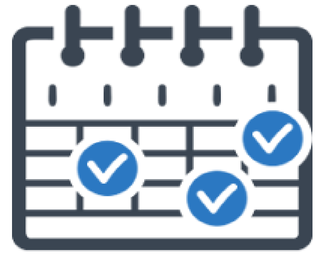

Table FG-1: Implementation Schedule and Interim Measurable Milestones

A. Structural & Non-Structural BMPs
No Data Found

B. Public Education & Outreach
No Data Found

C. Monitoring
No Data Found

Scheduling and milestone information:

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 target concentration(s) is presented under Element A of this plan. To achieve this target concentration, the annual 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 achieve 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 Gulf Pond.

Indirect Indicators of Load Reduction

Project-Specific Indicators

TMDL Criteria

Direct Measurements

Adaptive Management

References / Appendix

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Water Quality Assessment Reports

"*Millers River Watershed 2000 Water Quality Assessment Report*"

TMDL

"*Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes* "

Appendix A – Pollutant Load Export Rates (PLERs)

Land Use & Cover[1]	PLERs (lb/acre/year)		
	(TP)	(TSS)	(TN)
AGRICULTURE, HSG A	0.45	7.14	2.59
AGRICULTURE, HSG B	0.45	29.4	2.59
AGRICULTURE, HSG C	0.45	59.8	2.59
AGRICULTURE, HSG D	0.45	91.0	2.59
AGRICULTURE, IMPERVIOUS	1.52	650	11.3
COMMERCIAL, HSG A	0.03	7.14	0.27
COMMERCIAL, HSG B	0.12	29.4	1.16
COMMERCIAL, HSG C	0.21	59.8	2.41
COMMERCIAL, HSG D	0.37	91.0	3.66
COMMERCIAL, IMPERVIOUS	1.78	377	15.1
FOREST, HSG A	0.12	7.14	0.54
FOREST, HSG B	0.12	29.4	0.54
FOREST, HSG C	0.12	59.8	0.54
FOREST, HSG D	0.12	91.0	0.54
FOREST, HSG IMPERVIOUS	1.52	650	11.3
HIGH DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.27
HIGH DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.16
HIGH DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.41
HIGH DENSITY RESIDENTIAL, HSG D	0.37	91.0	3.66
HIGH DENSITY RESIDENTIAL, IMPERVIOUS	2.32	439	14.1
HIGHWAY, HSG A	0.03	7.14	0.27
HIGHWAY, HSG B	0.12	29.4	1.16
HIGHWAY, HSG C	0.21	59.8	2.41
HIGHWAY, HSG D	0.37	91.0	3.66
HIGHWAY, IMPERVIOUS	1.34	1,480	10.2
INDUSTRIAL, HSG A	0.03	7.14	0.27
INDUSTRIAL, HSG B	0.12	29.4	1.16

INDUSTRIAL, HSG C	0.21	59.8	2.41
INDUSTRIAL, HSG D	0.37	91.0	3.66
INDUSTRIAL, IMPERVIOUS	1.78	377	15.1
LOW DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.27
LOW DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.16
LOW DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.41
LOW DENSITY RESIDENTIAL, HSG D	0.37	91.0	3.66
LOW DENSITY RESIDENTIAL, IMPERVIOUS	1.52	439	14.1
MEDIUM DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.27
MEDIUM DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.16
MEDIUM DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.41
MEDIUM DENSITY RESIDENTIAL, HSG D	0.37	91.0	3.66
MEDIUM DENSITY RESIDENTIAL, IMPERVIOUS	1.96	439	14.1
OPEN LAND, HSG A	0.12	7.14	0.27
OPEN LAND, HSG B	0.12	29.4	1.16
OPEN LAND, HSG C	0.12	59.8	2.41
OPEN LAND, HSG D	0.12	91.0	3.66
OPEN LAND, IMPERVIOUS	1.52	650	11.3
[1]HSG = Hydrologic Soil Group			

Watershed-Based Plan – Stoddard Pond

MASSACHUSETTS
watershed·based plans

WATERSHED-BASED PLAN

Stoddard Pond

April 29, 2021

Prepared By:

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Prepared For:

MassDEP
Commonwealth of Massachusetts
Department of Environmental Protection

Contents

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).

1. General Watershed Information

Table A-1: General Watershed Information

Watershed Name (Assessment Unit ID):	Stoddard Pond (MA35083)
Major Basin:	MILLERS
Watershed Area (within MA):	2055.1 (ac)
Water Body Size:	52 (ac)

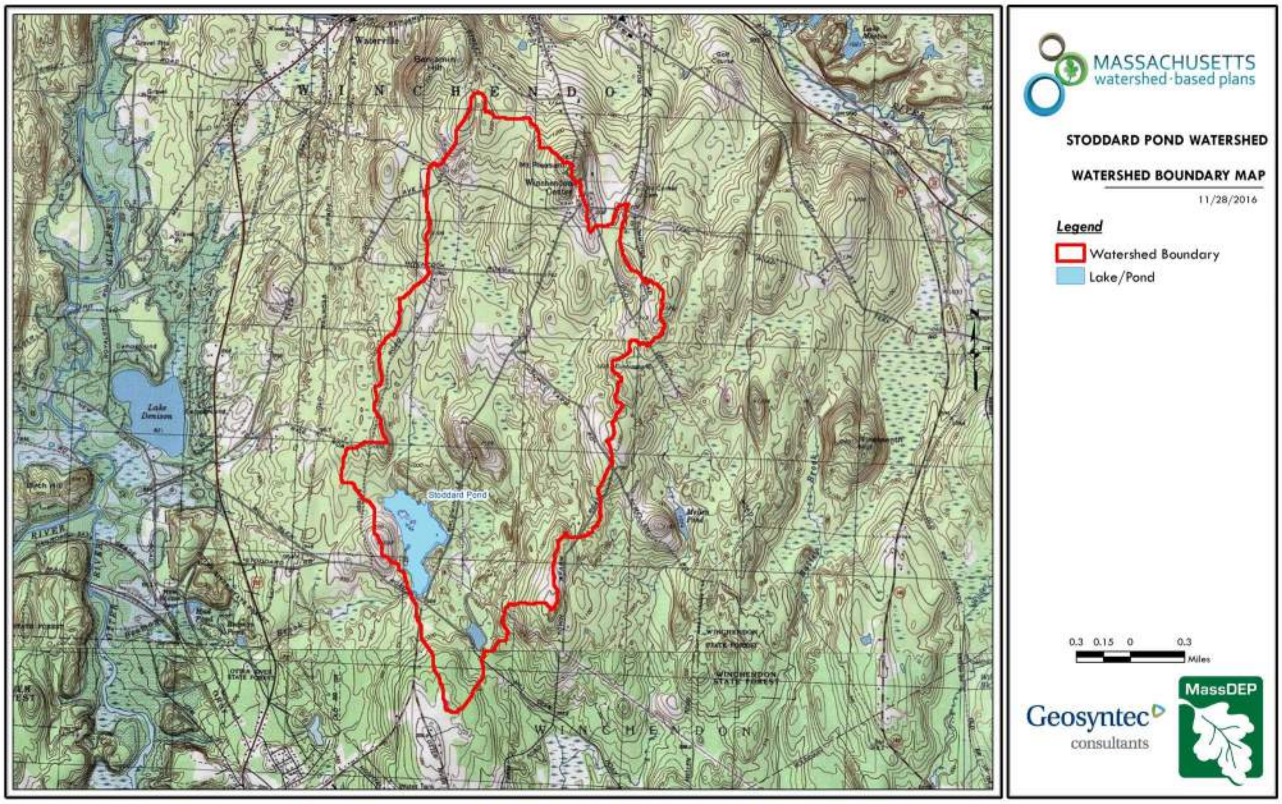

Figure A-1: Watershed Boundary Map (MassGIS, 1999; MassGIS, 2001; USGS, 2016)

Ctrl + Click on the map to view a full sized image in your web browser.

General watershed information:

2. MassDEP Water Quality Assessment Report and TMDL Review

The following reports are available:

- Millers River Watershed 2000 Water Quality Assessment Report
- Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

Millers River Watershed 2000 Water Quality Assessment Report (MA35083 - Stoddard Pond)
LAKE USE ASSESSMENTS Lake assessments are based on information gathered during DWM surveys (recent and historic) as well as pertinent information from other reliable sources (e.g., abutters, herbicide applicators, diagnostic/feasibility studies, MA DPH, etc.). The 1995 DWM

synoptic surveys focused on general observations of water quality and quantity (e.g., water level, sedimentation, etc.), the presence of native and non-native aquatic plants (as well as distribution and aerial cover), and presence/severity of algal blooms (Appendix B, Table B1). During 2000 more intensive in-lake sampling was conducted by DWM in two lakes (Stoddard and Whitney ponds) in the Millers River Watershed as part of the TMDL program. This sampling included in-lake measurements of dissolved oxygen, pH, temperature, Secchi disk transparency, nutrients, and chlorophyll a and detailed macrophyte mapping (Appendix B, Tables B2 and B3). While these surveys provided additional information to assess the status of the designated uses fecal coliform bacteria data were unavailable and, therefore, the Primary Contact Recreational Use was usually not assessed. To determine the status of the Fish Consumption Use fish consumption advisory information was obtained from the MA DPH (MA DPH 2002a). Although the Drinking Water Use was not assessed in this water quality assessment report the Class A waters were identified. Information on drinking water source protection and finish water quality is available at http://www.mass.gov/dep/brp/dws/dwshome.htm and from the Millers River Watershed's public water suppliers.

The use assessments and supporting information are entered into an EPA assessment database (either the WBS or the ADB). Data on the presence of non-native plants were entered into the MA DEP DWM informal non-native plant-tracking database.

AQUATIC LIFE

Habitat and Flow

Using guidelines developed by MA DEM to identify a river basin's stress level the Upper Naukeag Lake with a watershed drainage area of 1.90 square miles was rated at a high stress level based on the magnitude of stream flow. The criteria established for the high stress classification is net outflow equals or exceeds estimated natural August median flow (Gomez and Sullivan 2003). Because of the water withdrawals the Aquatic Life Use is identified with an Alert Status for this lake (Table 5).

Biology

Non-native aquatic macrophytes were observed in eight of the 65 lakes surveyed by DWM in 1995 and/or 2000 (Table 10 and Appendix B, Table B1). The three non-native aquatic species documented in the Millers River Watershed lakes were Myriophyllum heterophyllum (variable water milfoil), M. spicatum (Eurasian water milfoil) and Cabomba caroliniana (fanwort) (Figure 13). The mere presence of these species is considered an imbalance to the native biotic community and so these lakes are listed as impaired (808.9 acres). Additionally, these species have a high potential for spreading and are likely to have established themselves in downstream lake and river segments in the Millers River Watershed which may not have been surveyed. Figure 13 indicates where these non-native aquatic species were observed and the likely, or potential, avenues of downstream spreading.

Two non-native wetland species, Lythrum salicaria (purple loosestrife) and Phragmites australis (reed grass), were identified at three of the lakes surveyed by DWM in 1995 and/or 2000 (Table 5 and Appendix B, Table B1). Although the presence of these species is not generally a cause of impairment to lakes their invasive growth habit can result in the impairment of wetland habitat associated with lakes. Because of an unconfirmed report of a non-native species presence (Myriophyllum heterophyllum) in Sunset Lake (Ashburnham/Winchendon) the Aquatic Life Use there is identified with an Alert Status (Table 5).

Fish sampling using electrofishing, gillnetting, and shoreline seining was conducted in Stoddard and Whitney ponds in the Millers River Watershed by MA DFWELE in 2000 as part of the Lakes Survey for TMDL Development (Appendix E, Project 99-06/104). The fish sampling consisted of electrofishing at night during the spring and gillnetting and shoreline seining in the fall. A total of 10 species were collected in Stoddard Pond. The species collected, in order of abundance, were: yellow perch (Perca flavescens), golden shiner (Notemigonus crysoleucas), pumpkinseed (Lepomis gibbosus), black crappie (Pomoxis nigromaculatus), largemouth bass (Micropterus salmoides), chain pickerel (Esox niger), yellow bullhead (Ictalurus natalis), creek chubsucker (Erimyzon oblongus), brown bullhead (Ictalurus nebulosus), and bluegill (Lepomis macrochirus). A total of 13 species were collected in Whitney Pond. The species collected, in order of abundance, were: yellow perch, bluegill, black crappie, white sucker (Castosomus commersoni), pumpkinseed, golden shiner, largemouth bass, chain pickerel, creek chubsucker, brown bullhead, yellow bullhead, white perch (Morone americana), and tessellated darter (Etheostoma olmstedi).

[See figure on page 153 of Water Quality Assessment Report]

Beaver Flowage Pond

MA DFWELE conducted fish population sampling on Beaver Flowage Pond in Royalston using gillnet, angling and a barge electroshocker on August 29, 2000. Using the gillnet, a total of 62 fish represented by 7 species were collected. Fish species present, in order of abundance, were the following: largemouth bass (Micropterus salmoides), yellow perch (Perca flavescens), bluegill (Lepomis macrochirus), golden shiner (Notemigonus crysoleucas), chain pickerel (Esox niger), black crappie (Pomoxis nigromaculatus) and creek chubsucker (Erimyzon oblongus). Using angling, a total of 35 fish were collected. The most prevalent fish species was yellow perch (Perca flavescens). Other species present were black crappie (Pomoxis nigromaculatus) and bluegill

(Lepomis macrochirus). Using a barge electroshocker the following species were collected: golden shiner (Notemigonus crysoleucas), yellow perch (Perca flavescens), black crappie (Pomoxis nigromaculatus), and chain pickerel (Esox niger).

Minott Pond South

Fish population sampling was conducted by MA DFWELE at the north end of South Minot Pond/Westminster on 30 August 2000. Both gillnet and angling techniques were used. With gillnetting the following species were collected: golden shiner (Notemigonus crysoleucas), yellow perch (Perca flavescens), white sucker (Catostomus commersoni), chain pickerel (Esox niger), and pumpkinseed (Lepomis gibbosus). Pumpkinseed (Lepomis gibbosus) and chain pickerel (Esox niger) were collected by angling.

Lake Rohunta (Middle Basin)

MA DFWELE conducted fish population sampling in the Middle Basin of Lake Rohunta/Orange by boat shocking on 11 August 2000. Largemouth bass (Micropterus salmoides) and golden shiner (Notemigonus crysoleucas) were the dominant species collected. Other fish species present, in order of abundance, included: bluegill (Lepomis macrochirus), yellow perch (Perca flavescens), chain pickerel (Esox niger), black crappie (Pomoxis nigromaculatus), white sucker (Catostomus commersoni), and pumpkinseed (Lepomis gibbosus).

White Pond

White Pond in Athol was sampled by MA DFWELE using both gillnetting and angling on 28 July 2000. The fish population sample from angling was dominated by bluegill (Lepomis macrochirus). Other species present included: yellow perch (Perca flavescens), pumpkinseed (Lepomis gibbosus), black crappie (Pomoxis nigromaculatus), and largemouth bass (Micropterus salmoides). Using gillnetting the dominant species was chain pickerel (Esox niger). Other fish species that were collected included: white sucker (Catostomus commersoni), largemouth bass (Micropterus salmoides), yellow perch (Perca flavescens), brown bullhead (Ameiurus nebulosus), and black crappie (Promoxis nigromaculatus).

Tully Lake

On 12 September 2000 MA DFWELE conducted fish population sampling on Tully Lake in Royalston. A total of 220 fish were collected using boat shocking. The most dominant species was yellow perch (Perca flavescens), followed by largemouth bass (Micropterus salmoides), bluegill (Lepomis macrochirus), pumpkinseed (Lepomis gibbosus), and chain pickerel (Esox niger). Other species present included: black crappie (Pomoxis nigromaculatus), golden shiner (Notemigonus crysoleucas) and creek chubsucker (Erimyzon oblongus).

Snake Pond

Fish population sampling was conducted by MA DFWELE on Snake Pond in Gardner on 15 August 2000. Yellow perch (Perca flavescens) was the dominant species collected by gillnetting while largemouth bass (Micropterus salmoides) was the dominant species collected by angling. Other species present included pumpkinseed (Lepomis gibbosus) and chain pickerel (Esox niger).

Martin Lake

Yellow perch (Perca flavescens) was the dominant fish species found in Martin Lake/Winchendon in sampling conducted by MA DFWELE. Both angling and gillnetting were used to collect fish on 17 July 2000.

Chemistry – tissue

Beaver Flowage Pond (Beaver Pond)

A total of four fish were collected from this pond in September 1999. These included a 4-year old brown bullhead and three yellow perch (two of which were estimated as 9-year olds and one was not aged). The total PCB concentrations in the “whole fish” samples of these fish ranged from 47 to 214 ppb wet weight (ENSR 2000). None of these “whole fish” samples had levels of total PCB that exceeded the NAS/NAE guideline for total PCB (Coles 1998) of 500 ppb wet weight for the protection of fish-eating wildlife.

Lake Denison

A total of three fish were collected from this pond in October 1999. These included a 7-year old yellow perch and two 5-year old largemouth bass. The total PCB concentrations in the “whole fish” samples of these fish ranged from 227 to 1,245 ppb wet weight (ENSR 2000). Both of the largemouth bass samples had levels of total PCB that exceeded (2.0 and 2.5 times) the NAS/NAE guideline for total PCB (Coles 1998) of 500 ppb wet weight for the protection of fish-eating wildlife.

Chemistry-water

Oxygen depletion occurred below 1.0 m in September 2000 in both Whitney and Stoddard ponds (Appendix B, Table B2). However, it is suspected that these ponds are highly influenced by wetland drainage as evidenced by high color values and low pH and alkalinity and, therefore, these low dissolved oxygen conditions may be naturally occurring. The total phosphorus concentrations were moderately high and the deep-water samples show evidence of phosphorus release due to the anoxic conditions in Whitney Pond. Total phosphorus concentrations were low to moderately high in Stoddard Pond. Despite these results, there are too little data (some data were censored) to assess the status of the Aquatic Life Uses for either of these ponds. Because oxygen depletion occurs at such shallow depth, however, this use is identified with an Alert Status for both ponds. Additional data/information needs to be researched to determine if these conditions are naturally occurring or anthropogenically induced.

Chemistry-sediment
Surficial sediment sampling was conducted at two lakes (Beaver Flowage Pond in Royalston and Lake Denison in Winchendon) in August 1999. Sediment samples were collected from three stations at each waterbody and analyzed for PCBs. None of the samples had detectable levels of PCBs (ENSR 2000).

The Aquatic Life Use was assessed as impaired in eight lakes (including the three basins of Lake Rohunta) based on the confirmed presence of non-native macrophyte(s) representing a total of 808.9 acres (Table 5). While Stoddard and Whitney ponds in Winchendon were not assessed for the Aquatic Life Use the use was identified with an Alert Status because of oxygen depletion at shallow depth and slight to moderately elevated phosphorus concentrations (Appendix B, Table B2). Crystal Lake in Gardner was not assessed for this use but was identified with an Alert Status because of elevated aluminum concentrations in the Gardner Water Treatment Facility discharge. Because of elevated PCB levels in “whole fish” samples the Aquatic Life Use for Lake Denison is identified with an Alert Status (Table 5). The Aquatic Life Use is also identified with an Alert Status in Sunset Lake since there is an unconfirmed report of a non-native species (Myriophyllum heterophyllum). The remaining 57 lakes, representing 3,185.1 acres, in the Millers River Watershed were not assessed for the Aquatic Life Use because of the cursory nature of the 1995 synoptic surveys and/or the lack of dissolved oxygen data and other more recent observations.

FISH CONSUMPTION
In July 2001 MA DPH issued new consumer advisories on fish consumption and mercury contamination. The MA DPH “…is advising pregnant women, women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age to refrain from eating the following marine fish; shark, swordfish, king mackerel, tuna steak and tilefish. In addition, MA DPH is expanding its previously issued statewide fish consumption advisory which cautioned pregnant women to avoid eating fish from all freshwater bodies due to concerns about mercury contamination, to now include women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age (MA DPH 2001).” Additionally, MA DPH “…is recommending that pregnant women, women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age limit their consumption of fish not covered by existing advisories to no more than 12 ounces (or about 2 meals) of cooked or uncooked fish per week. This recommendation includes canned tuna, the consumption of which should be limited to two (2) cans per week. Very small children, including toddlers, should eat less. Consumers may wish to choose to eat light tuna rather than white or chunk white tuna, the latter of which may have higher levels of mercury (MA DPH 2001).” MA DPH’s statewide advisory does not include fish stocked by the state Division of Fisheries and Wildlife or farm-raised fish sold commercially. The advisory encompasses all freshwaters in Massachusetts and, therefore, the Fish Consumption Use for lakes in the Millers River Basin cannot be assessed as support.

Fish from a total of six lakes in the Millers River Basin were sampled in either 1994 or 1995 as part of a research and development study on mercury contamination developed by the Department’s Office of Research and Standards (ORS). The lakes included Upper Naukeag Lake (Ashburnham), Hilchey Pond (Gardner), Sheomet Lake (Warwick), Upper Reservoir (Westminster), Laurel Lake (Erving/Warwick), and Gales Pond (Warwick). Fish toxics monitoring (metals, PCB, and organochlorine pesticide in edible fillets) was conducted by DWM in Lake Rohunta (Athol/New Salem/Orange) in July 1995 and in Lake Denison (Winchendon) in August 1995 and again in June 1996. These data can be found in Appendix A, Table 14. Upper Reservoir (Westminster) was sampled again in 2001 and 2002 as part of a seasonal ORS study of mercury. Mercury concentrations in largemouth bass and yellow perch all exceeded the MA DPH action level. Upper Reservoir will continue to be sampled as part of an ongoing long-term study being conducted by DEP ORS.

Fish from two lakes, Beaver Flowage Pond and Lake Denison, were sampled in 1999 (September and October, respectively) as part of a site assessment and risk characterization of PCBs at Birch Hill Reservoir (ENSR 2000). The concentration of total PCB in four individual fish fillet samples (one brown bullhead and three yellow perch) from Beaver Flowage Pond ranged from 0.001 to 0.004 ppm wet weight. The concentration of total PCB in three individual fish fillet samples (one yellow perch and two largemouth bass) from Lake Denison ranged from 0.051 to 0.161 ppm wet weight (ENSR 2000).

The most recent MA DPH Fish Consumption List recommends the following for lakes in the Millers River Watershed (MA DPH 2002a).

Lake Denison (Winchendon) because of mercury.
1. “Children younger than 12 years, pregnant women, and nursing mothers should not eat any largemouth bass from this waterbody.”
2. “The general public should limit consumption of largemouth bass from this waterbody to two meals per month.”
Lake Rohunta - north, middle, south basins (Athol, New Salem, Orange) because of mercury.
1. “Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from this water body.”
2. “The general public should limit consumption of all fish from this water body to two meals per month.”
Gales Pond (Warwick) because of mercury.
1. “Children younger than 12 years, pregnant women, and nursing mothers should not eat any yellow perch from this waterbody.”
2. “The general public should limit consumption of yellow perch from this waterbody to two meals per month.”
Upper Naukeag Lake (Ashburnham) because of mercury.
1. “Children younger than 12 years, pregnant women, and nursing mothers should not eat any small mouth bass or yellow perch from this waterbody.”
2. “The general public should limit consumption of small mouth bass or yellow perch from this waterbody to two meals per month.”
Upper Reservoir (Westminster) because of mercury.
1. “Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from this water body.”
2. “The general public should limit consumption of all fish from this water body to two meals per month.”
Additionally, the Millers River advisory is also in place and covers Whitney Pond (all towns from Erving to Winchendon) because of mercury and PCBs.
1. “Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from this waterbody and its tributaries.”
2. “The general public should not consume any brown trout or American eel taken from this waterbody downstream from its confluence with the Otter River.”
3. “The general public should limit consumption of all non-affected fish from this waterbody and its tributaries to two meals per month.”

Eight lakes (including the above mentioned six lakes plus the other two basins of Lake Rohunta), representing a total of 956 acres, are assessed as impaired (due to mercury contamination) for the Fish Consumption Use (Table 5). The remaining 57 lakes, representing 3,038 acres, are not assessed for the Fish Consumption Use. It should be noted, however, that the Fish Consumption Use for Lake Monomonac is identified with an Alert Status because of elevated levels of mercury in fish were reported by the NH DES (NH DES 2003). [NOTE: The MA DPH fish consumption advisory list contains the status of each water body for which an advisory has been issued. If a water body is not on the list it may be because either an advisory was not warranted or the water body has not been sampled. MA DPH’s most current Fish Consumption Advisory list is available online at http://www.state.ma.us/dph/beha/fishlist.htm.] The source of mercury is unknown although atmospheric deposition is suspected.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS
In 1995 DWM conducted synoptic surveys of 64 lakes in the Millers River Watershed. These surveys included general observations of water quality and quantity, the presence of native and non-native aquatic plants (and presence/severity of algal blooms (Appendix B, Table B1). Additional data were collected in two of these lakes by DWM in 2000 for the purpose of TMDL development. These data, combined with the 1998 303(d) List of Waters, MA DEM and public bathing beach bacteria data, MA DPH beach posting data and diagnostic/feasibility studies were used to assess the recreational and aesthetics uses.

Bacteria samples were collected at the following MA DEM beaches: Dunn Pond State Park in Gardner, Ruggles Pond in the Wendell State Forest in Wendell, Laurel Lake in the Erving State Forest in Erving/Warwick, Beamans Pond in the Otter River State Forest in Templeton/Winchendon and the Lake Denison Recreational Area in the Otter River State Park in Winchendon. With the exception of Beamans Pond none of these beaches were reported closed or posted during the 2001 or 2002 swimming season. Although it is not a named segment in this report Beamans Pond campground beach at Otter River State Forest was closed due to elevated bacteria counts between 9 and 12 July 2001. The beach was also closed between 28 and 31 May 2002 due to elevated bacteria counts (MA DPH 2001 and 2002).

Bacteria samples were collected from two town bathing beaches during the summer of 2000 and 2001 (Kendall Pond in Gardner and Lake Mattawa in Orange), however, no quality assurance data were available. Elevated fecal coliform bacteria counts were reported from Kendall Pond (City of Gardner 2002), however, no postings were reported. Due to the elevated bacteria levels detected in Kendall Pond, the Primary Contact Recreational Use is identified with an Alert Status. It should be noted, however, that a sanitary sewer project was completed in 1999 for sewering the homes around Kendall Pond (Asen 2003). A total of eight fecal coliform bacteria samples were collected from Lake Mattawa between June and September 2000. None of the counts exceeded 150 cfu/100mls and no beach closures have been reported (Town of Orange 2002). It should also be noted that the beach at Silver Lake in Athol (not a segment in this report) was closed between 2 and 9 July 2001 because of elevated bacteria counts.

The Primary and Secondary Contact Recreational and Aesthetic uses were assessed as support in five lakes (Dunn Pond, Lake Denison, Lake Mattawa, Laurel Lake, and Ruggles Pond), representing a total of 282 acres (Table 5). The Primary and Secondary Contact Recreational and Aesthetics uses are not assessed in the remaining 60 lakes (3,712 acres) in the Millers River Watershed because of a lack of bacteria, transparency and in-lake survey data.

SUMMARY
A total of 13 of the 65 lakes in the Millers River Watershed assessed in this report were impaired for either the Aquatic Life Use and/or the Fish Consumption Use (Table 5). Causes of impairment included non-native plant infestation and mercury contamination. Eight lakes, totaling 956 acres, were impaired for the Fish Consumption Use due to mercury contamination. Five lakes, totaling 282 acres, supported the Primary and Secondary Contact Recreational and Aesthetics uses. A total of 48 lakes (1,581.9 out of 3,994 acres) were not assessed for any uses.

Due to the focus of the lake surveys (synoptic surveys and surveys conducted for the TMDL program) the major cause for use impairment was non-native aquatic vegetation. Mercury contamination was also a cause for impairment. Beach closure information from MA DEM and town beaches was used to assess the recreational and aesthetics uses for the Millers River Watershed.

TMDL survey conducted in 2000 and synoptic survey in 1995 (Appendix B, Tables B1, B2, and B3). This pond had low dissolved oxygen/saturation at depths below 1.0m, low pH and alkalinity, and high color (Appendix B, Table B2). These data are likely indicative of natural conditions associated with the wetlands upstream. While there are low to moderate levels of total phosphorus in the pond (concentrations ranging between 0.024 to 0.037mg/L), they did not result in high lake productivity (i.e., low to moderate chlorophyll a concentrations). Biovolume density estimated as 85% dense/very dense cover and no non-native aquatic plants were identified (Appendix B). The fish population sample was dominated by yellow perch. The Aquatic Life Use is identified with an “Alert Status”, however, because it is undetermined if the phosphorus concentrations were elevated as a result of anthropogenic sources. The Secchi disc depths ranged from 1.4 to >1.8 m (meeting the bathing beach guidelines) even though the water was colored. No fecal coliform bacteria data are currently available and, therefore, the Primary and Secondary Contact Recreational uses are currently not assessed. There is no public bathing beach on the pond. Stoddard Pond is on the 1998 303(d) List of Waters because of noxious aquatic plants (Table 3). The TMDL of Phosphorus for this pond is to be reduced from the current estimated loading of 179 kg/year to a target load of 127 kg/year (29% reduction) (MA DEP 2002).

Report Recommendations:
RECOMMENDATIONS – LAKES
• Careful consideration should be given to WMA permits for the Ashburnham and Winchendon Water Departments since Upper Naukeag Lake was identified at a high stress level based on water quantity (Gomez and Sullivan 2003). Furthermore, some of the water withdrawn from Upper Naukeag Lake is transferred out of the upper Millers River subwatershed to the Otter River subwatershed, the Middle River subwatershed, and the Nashua River Basin.

• MPDH is currently reevaluating their Fish Consumption Advisory for the Millers River Watershed. MA DEP has recommended that a site-specific advisory be issued for Whitney Pond because of elevated mercury. Additional fish toxics monitoring in the lakes in the Upper Millers River and North Branch Millers River subwatersheds should be conducted (Sunset Lake, Lower Naukeag, Lake Monomonac, Lake Watatic, and Wallace Pond).

• Confirm the presence of Myriophyllum heterophyllum, which is suspected to occur in Sunset Lake (Ashburnham/Winchendon).

• Coordinate with MA DCR and/or other groups conducting lake surveys to generate quality assured lakes data. Conduct more intensive lake surveys to better determine the lake trophic and use support status and identify causes and sources of impairment. As sources are identified within lake watersheds they should be eliminated or, at least, minimized through the application of appropriate point or non-point source control techniques.

• Implement recommendations identified in the TMDLs and lake diagnostic/feasibility studies, including lake watershed surveys to identify sources of impairment. Specific recommendations from the TMDL study include the following:
 Bourn-Hadley Pond has an unregulated sand and gravel operation on the western shore. This site should be investigated to

ensure that best management practices are being utilized and that it is in compliance with the Wetlands Protection Act.
 Lake Ellis has initiated a program to treat the lake with herbicides that have been effective in controlling the plants in the lake. Designated use zoning is recommended to target areas for plant control.
 South Athol Pond has a gravel operation on the eastern shore that should be investigated to ensure that best management practices are being utilized so that water quality is protected.

• In-lake management of rooted aquatic plants is recommended for the following recreational lakes that have public access and are deep enough to offer recreational opportunities such as swimming and boating: Lake Ellis, Lower Naukeag Lake, Lake Monomonac, Parker Pond and Whitney Pond. Designated use zoning is recommended to target areas for plant control (MA DEP 2002).

• Continue to review data from "Beaches Bill" required water quality testing (bacteria sampling at all formal bathing beaches) to assess the status of the recreational uses.

• Quick action is necessary to manage non-native aquatic or wetland plant species that are isolated in one or a few location(s), in order to alleviate the need for costly and potentially fruitless efforts to do so in the future. Two courses of action should be pursued concurrently. More extensive surveys need to be conducted, particularly downstream from these recorded locations to determine the extent of the infestation. And, "spot" treatments (refer to the draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts [Mattson et al. 2004] for advantages and disadvantages of each) should be undertaken to control populations at these sites. These treatments include careful hand-pulling of individual plants in small areas. In larger areas other techniques, such as selective herbicide application, may be necessary. In either case, the treatments should be undertaken prior to fruit formation and with a minimum of fragmentation of the individual plants. These actions will minimize the spreading of the populations. This draft aquatic plant report (Mattson et al. 2004) should be consulted prior to the development of any lake management plan to control non-native aquatic or wetland plant species.

• Where non-native plant infestations are more extensive, conduct additional monitoring to determine the extent of the problem. The draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson et al. 2004) should be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should be discouraged because of the propensity for some invasive species of these plants to reproduce and spread vegetatively (from cuttings).

• Prevent spreading of invasive plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and responsibility of spreading these species.

• Review the MA DEP Drinking Water Program Source Water Assessment Program evaluations are when they are completed to develop and implement recommendations for the protection of Class A lakes in the Millers River Basin including Upper Naukeag Lake, Crystal Lake, Cowee Pond and Perley Brook Reservoir.

Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

(MA35083 - Stoddard Pond)

Stoddard Pond in Winchendon is a large pond of approximately 52 acres with an 8 foot dam (maximum depth of 2.7m or 9 feet). The dominant landuse in the watershed are 76 percent forest, followed by 10 percent rural and 9 percent agricultural landuse. Most of rest of the watershed consists of water and wetlands. Population in Winchendon ranged between 7,019 and 8,805 from

1980 to the 1990 census. Miser predictions on growth are 9,637 for the year 2000 and 11,054 for the year 2010 with an estimated 20 year growth rate of about 26 percent. Stoddard Pond was assessed by DEP in the summer of 1995 and the assessment comments reported: " August 22, 1995 synoptic survey indicated about 30% of the pond surface was covered with patches of floating leaf plants." Data from a 3 month baseline survey conducted by DEP/MDFW during the summer of 2000 showed the lake covered with dense beds of native macrophytes. These macrophytes allow weak stratification and oxygen depletion below 1 m depth. The pond had an average total phosphorus at the surface of 0.025 mg/l. The average Secchi disk transparency ranged from 1.4 to 1.8 meters (average 1.6) but some of this low transparency was due to color which averaged 150 PCU (one qualified point omitted). The chlorophyll a ranged between 2.9 and 8.6 ug/l. The Carlson Trophic Index of 50 indicates eutrophic conditions with indications of reduction in transparency due to natural color.

No detailed study of the nutrient sources within the lake watersheds has been conducted to date. Thus, nutrient sources were estimated based on land use modeling within the DEP's NPSLAKE model. The NPSLAKE model was designed to estimate watershed loading rates of phosphorus to lakes. The phosphorus loading estimates from the model are used with estimates of water runoff and these are used as inputs into a water quality model of Reckhow (1979). A brief description of the NPSLAKE model and data inputs is given here. MassGIS digital maps of land use (1985 or 1999 when available) within the watershed were used to calculate areas of landuse within three major types: Forest, rural and urban landuse. This model takes the area in hectares of land use within each of three categories and applies an export coefficient to each to predict the annual external loading of phosphorus to the lake from the watershed. Because some of the landuse data is based on old (1985) aerial photographs, the current landuses within the watershed may be different today. This can be important in the development of the TMDL because different landuses can result in different phosphorus loadings to the waterbody in question. For many rural areas, landuse changes often result in conversion of open or agricultural lands to low density housing, in which case, the export coefficients of the NPSLAKE model are the same and no change in loading is predicted to occur. However, in cases where development changes forests to residential areas or rural landuses to urban landuses, phosphorus loadings are predicted to increase. In some cases, loadings are predicted to decrease if additional agricultural land is abandoned and forest regrowth occurs. To account for this uncertainty in landuse changes, a conservative target is chosen. In addition, the MassGIS landuse maps are scheduled to be updated with current aerial photos and the TMDL can be modified as additional information is obtained.

Other phosphorus sources, such as septic system inputs of phosphorus, are estimated from an export coefficient multiplied by the number of homes within 100 meters of the lake. Point sources are estimated manually based on discharge information and site specific information for uptake and storage. Other sources such as atmospheric deposition to lakes was determined to be small and not significant in the NPSLAKE model, perhaps because lakes tend to be sinks rather than sources of phosphorus. For similar reasons, wetlands were also not considered to be significant sources of phosphorus following. Other, non-landuse sources of phosphorus such as inputs from waterfowl were generally not included, but can be added as additional information becomes available. If large numbers of waterfowl are using the lake the total phosphorus budget may be an underestimate, and control measures should be considered.

An internal source (recycling) of phosphorus is not included because it is not considered as a net external load to the lake, but rather a seasonal recycling of phosphorus already present in the lake. In cases where this internal source is large it may result in surface concentrations higher than predicted from landuse loading models and may contribute to water quality violations during the critical summer period. As additional monitoring data become available, these lakes will be assessed for internal contributions and possibly control of these sources by alum or other means. The major sources according to the land use analysis are shown in the table below (from "Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes", 2003).

Table Stoddard Pond MA35083

Total Estimated Nonpoint Source Pollution loads based on GIS Landuse

Watershed Area=	814.7 Ha (3.1 mi2)
Average Annual Water Load =	4966628.6 m3/yr (5.6 cfs)
Average Runoff=	61.0 cm/yr (24.0 in/yr)
Lake area=	21.0 Ha. (51.8ac)
Areal water loading to lake: q=	23.7 m/yr.
Homes with septic systems within 100m of lake.=	21.0
Other P inputs =	0.0 kg/yr

Estimate of annual Nonpoint Source Pollution Loads by land use

Land use	Area Ha (%)	P Load kg/yr (%)	N Load kg/yr	TSS Load kg/yr
Forest category				
Forest:	616.3 (75.6)	80.1 (45.2)	1540.6	14790.2
Rural category				
Agriculture:	70.4 (8.6)	21.1 (11.9)	484.2	14026.7
Open land:	46.5 (5.7)	13.9 (7.9)	241.7	2010.3
Residential Low:	35.0 (4.3)	10.5 (5.9)	192.6	13585.5
Other Landuses				
Water:	24.6 (3.0)	0.0 (0.0)	0.0	0.0
Wetlands:	13.4 (1.6)	0.0 (0.0)	0.0	710.2
Other P inputs:	NA	0.0 (0.0)		
21.0 Septics:	NA	10.5 (5.9)		
Urban category				
Residential High:	1.2 (0.1)	5.5 (3.1)	6.3	537.7
Comm - Ind:	7.5 (0.9)	35.6 (20.1)	74.3	303.4
Total	814.7 (100.0)	177.2(100)	2555.0	46166.1

Summary of Lake Total Phosphorus Modeling Results

Areal P loading L= 0.8 g/m2/yr.

Reckhow (1979) model predicts lake TP = L/(11.6+1.2q)*1000 = 21.1 ppb.

Predicted transparency = 2.3 meters.

The NPSLAKE model assumes land uses are accurately represented by the MassGIS digital maps and that land use has not changed appreciably since the maps were compiled in 1985. The predicted loading is based on the equation:

P Loading (kg/yr)= 0.5* septics + 0.13* forest ha + 0.3* rural ha + 14* (urban ha)^0.5

The coefficients of the model are based on a combination of values estimated with the aid of multiple regression on a Massachusetts data set and of typical values reported in previous diagnostic/feasibility studies in Massachusetts. All coefficients fall within the range of values reported in other studies. The overall standard error of the model is approximately 172 kg/yr. If no data is available for internal loading a rough estimate of the magnitude of this source can be estimated from the Reckhow model by substitution of the in-lake concentration for TP. The difference in predicted loadings from this approach and the landuse approach is the best estimate of internal loading.

The NPSLAKE model also generates predictions of estimated yearly average water runoff to the lake based on total watershed area and runoff maps of Massachusetts. Other estimates of nitrogen and total suspended solids (TSS) loading rates are provided here for informational and comparison purposes only.

Because of the general nature of the landuse loading approach, natural background is included in land use based export coefficients. Natural background can be estimated based on the forest export coefficient of 0.13 kg/ha/yr multiplied by the hectares of the watershed assuming the watershed to be entirely forested. Without site specific information regarding soil phosphorus and natural erosion rates the accuracy of this estimate would be uncertain and would add little value to the analysis.

A recent report on nonpoint source pollution in the Millers basin used slightly different phosphorus coefficients based on the EPA Nationwide Urban Runoff Program (NURP) to estimate loads to several of the lakes (MRPC & FRCG, 2002). Although the two estimates are correlated there is no consistent difference (bias) between the models. The nonlinear Urban landuse loading coefficient used in NPSLAKE may explain some of the variation between the models. Because the NPSLAKE model has been verified against measured loads to lakes, the NPSLAKE loads will be used as a basis for these TMDLs.

MRPC & FRCG. 2002. Assessment of Potential Nonpoint Source Pollution for the Millers River Watershed in Massachusetts. Montachusett Regional Planning Agency, Fitchburg, MA and Franklin Regional Council of Governments, Greenfield, MA. Mass DEP and US EPA.

Reckhow, K.H. 1979. Uncertainty Analysis Applied to Vollenweider's Phosphorus Loading Criteria. J. Water Poll. Control Fed. 51(8):2123-2128.

Literature review information:

3. Water Quality Impairments

Known water quality impairments, as documented in the Massachusetts Department of Environmental Protection (MassDEP) 2012 Massachusetts Integrated List of Waters, are listed below. Impairment categories from the Integrated List are as follows:

Table A-2: 2012 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.

Table A-3: Water Quality Impairments

Assessment Unit ID	Waterbody	Integrated List Category	Designated Use	Impairment Cause	Impairment Source
MA35083	**Stoddard Pond**	**4A**	Aesthetic	Aquatic Plants (Macrophytes)	Source Unknown
MA35083	**Stoddard Pond**	**4A**	Primary Contact Recreation	Aquatic Plants (Macrophytes)	Source Unknown
MA35083	**Stoddard Pond**	**4A**	Secondary Contact Recreation	Aquatic Plants (Macrophytes)	Source Unknown

4. 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. StoddardPond is a Class 'B' waterbody. The water quality goal for fecal coliform bacteria is based on the Massachusetts Surface Water Quality Standards.

Table A-4: Surface Water Quality Classification by Assessment Unit ID

Assessment Unit ID	Waterbody	Class
MA35083	Stoddard Pond	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.).

Table A-5: Water Quality Goals

Pollutant	Goal	Source
Total Phosphorus (TP)	The target in-lake total phosphorus concentration chosen is based on consideration of the typical concentrations expected in lakes in the region. The phosphorus ecoregion map of Griffith et al. (1994) is based on spring/fall concentrations, while the phosphorus ecoregion map of Rohm et al., (1995) is based on summer concentrations. The following table (from "Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes", 2003) shows the ecoregion expected TP concentrations for both spring and summer, and the target TP that was chosen for each lake in the Millers watershed. The TP predicted by the NPSLAKE model of DEP and the surface TP concentrations are also shown for comparison. Note that according to the Carlson Trophic State analysis (Carlson,1977) a lake should have total phosphorus concentrations of about 40 ppb to meet the 4-foot transparency requirement for swimming beaches in Massachusetts. The target should be set lower than this to allow for a margin of safety. The lower phosphorus concentrations will lessen the chance of nuisance algal blooms, which may occur as macrophyte biomass is reduced by direct controls.	Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

WBID	Lake Name	TP (ppb) range in Griffith ecoregion	TP (ppb) range in Rohm ecoregion	NPSLAKE Predicted TP (ppb)	*Surface TP data (ppb)	Selected Target TP (ppb)
MA35005	Beaver Pond	5-9	15-19	12.5	NA	12.5
MA35007	Bents Pond	5-9	15-19	33.5	60	15
MA35008	Bourn-Hadley	5-9	15-19	31.1	NA	15
MA35010	Brazell Pond	5-9	15-19	42.1	NA	15
MA35013	Cowee Pond	5-9	15-19	12.7	NA	12.7
MA35015	Davenport Pond	5-9	15-19	12.7	60	12.7
MA35017	Lake Denison	5-9	15-19	20.1	32	15
MA35018	Depot Pond	5-9	15-19	32.2	NA	15
MA35023	Ellis Pond	5-9	15-19	17.5	50	15
MA35025	Greenwood Pond 1	5-9	15-19	13.9	NA	13.9
MA35026	Greenwood Pond 2	5-9	15-19	35.5	NA	15
MA35029	Hilchey Pond	5-9	15-19	27.4	NA	19
MA35041	Lower Naukeag	5-9	15-19	14.5	20	14.5
MA35045	Minott Pond South	5-9	15-19	11.0	NA	11.0
MA35046	Minott Pond	5-9	15-19	16.6	NA	15
MA35047	Lake Monomonac	5-9	15-19	13.3	14	13.3
MA35056	Parker Pond	5-9	15-19	30.0	NA	15
MA35062	Ramsdall Pond	5-9	15-19	32.4	NA	15
MA35063	Reservoir No. 1	5-9	15-19	21.1	NA	15
MA35064	Reservoir No. 2	5-9	15-19	5.1	NA	5.1
MA35065	Riceville Pond	5-9	15-19	15.1	NA	15
MA35078	South Athol Pond	5-9	15-19	17.5	20	15
MA35083	Stoddard Pond	5-9	15-19	21.1	25	15
MA35092	Wallace Pond	5-9	15-19	13.7	NA	13.7
MA35093	Ward Pond	5-9	15-19	15.4	50	15
MA35099	Whites Mill Pond	5-9	15-19	19.8	NA	15
MA35101	Whitney Pond	5-9	15-19	18.5	37	15
MA35104	Wrights Reservoir	5-9	15-19	13.5	60	13.5

NA=Not Available

Shallow nutrient rich sediments offer an ideal habitat for natural growth of aquatic macrophytes, which provide habitat for fish and wildlife and as such complete elimination of macrophytes is neither possible nor desired. In many cases, the proliferation of aquatic macrophytes in the pond is a natural condition resulting from nutrient rich riparian soils being flooded when streams and lakes were dammed for hydropower. Thus reducing the supply of external phosphorus may not meet the goals of the TMDL without additional management in the lake.

For the table, Griffith ecoregions are based on Griffith et al. (1994). Rohm ecoregions are based on Rohm et al., (1995). Latest surface total phosphorus concentrations are based on survey data. Note: Recent surveys in 2000 have total phosphorus methods which can detect low concentrations accurately with a method detection limit of 5 ppb. The remaining early (pre-1990) survey TP concentrations have a detection limit of approximately 50 ppb, and values reported for these lakes that are less than this detection limit are suspect.

In cases where the NPSLAKE model predicted current total phosphorus concentrations lower than the ecoregion targets, we chose to maintain the lower current total phosphorus concentrations as the final target. Lakes with higher TP than the model estimates may have unknown sources or internal sources of phosphorus.

Carlson, R.E. 1977. A Trophic State Index for Lakes. Limnol. Oceanogr. 22(2):361-369.
Griffith, G.E., J.M. Omernik, S.M. Pierson, and C.W. Kiilsgaard. 1994. Massachusetts Ecological Regions Project. USEPA Corvallis. Massachusetts DEP, DWM Publication No. 17587-74-70-6/94-D.E.P.
Rohm, C.M., J.M. Omernik, and C.W. Kiilsgaard. 1995. Regional Patterns of Total Phosphorus in Lakes of the Northeastern United States. Lake and Reservoir Man. 11(1): 1-14.

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)

Note: *There may be more than one water quality goal for bacteria due to different Massachusetts Surface Water Quality Standards Classes for different Assessment Units within the watershed.*

5. Land Use Information

A. Watershed Land Uses

Table A-6: Watershed Land Uses

Land Use	Area (acres)	% of Watershed
Agriculture	107.99	5.3
Commercial	0.42	0
Forest	1613.3	78.5
High Density Residential	0	0
Highway	0	0
Industrial	18.31	0.9
Low Density Residential	186.78	9.1
Medium Density Residential	0	0
Open Land	63.55	3.1
Water	64.71	3.1

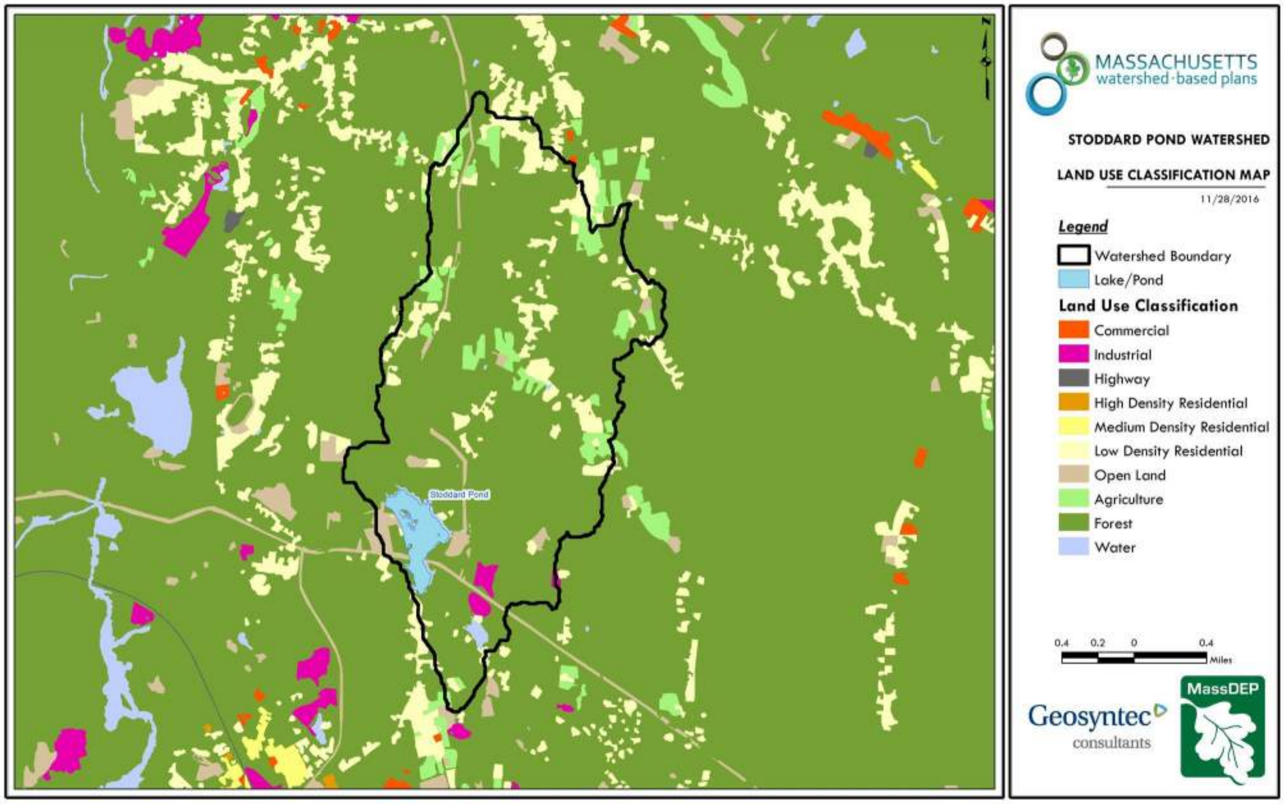

Figure A-2: Watershed Land Use Map (MassGIS, 2009b; MassGIS, 1999; MassGIS, 2001; USGS, 2016)

Ctrl + Click on the map to view a full sized image in your web browser.

B. 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 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 watershed 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.

Estimated TIA in the watershed: 3.2 %

Estimated DCIA in the watershed: 1.9 %

The relationship between TIA and water quality can generally be categorized as follows (Schueler et al. 2009):

Table A-7: 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.

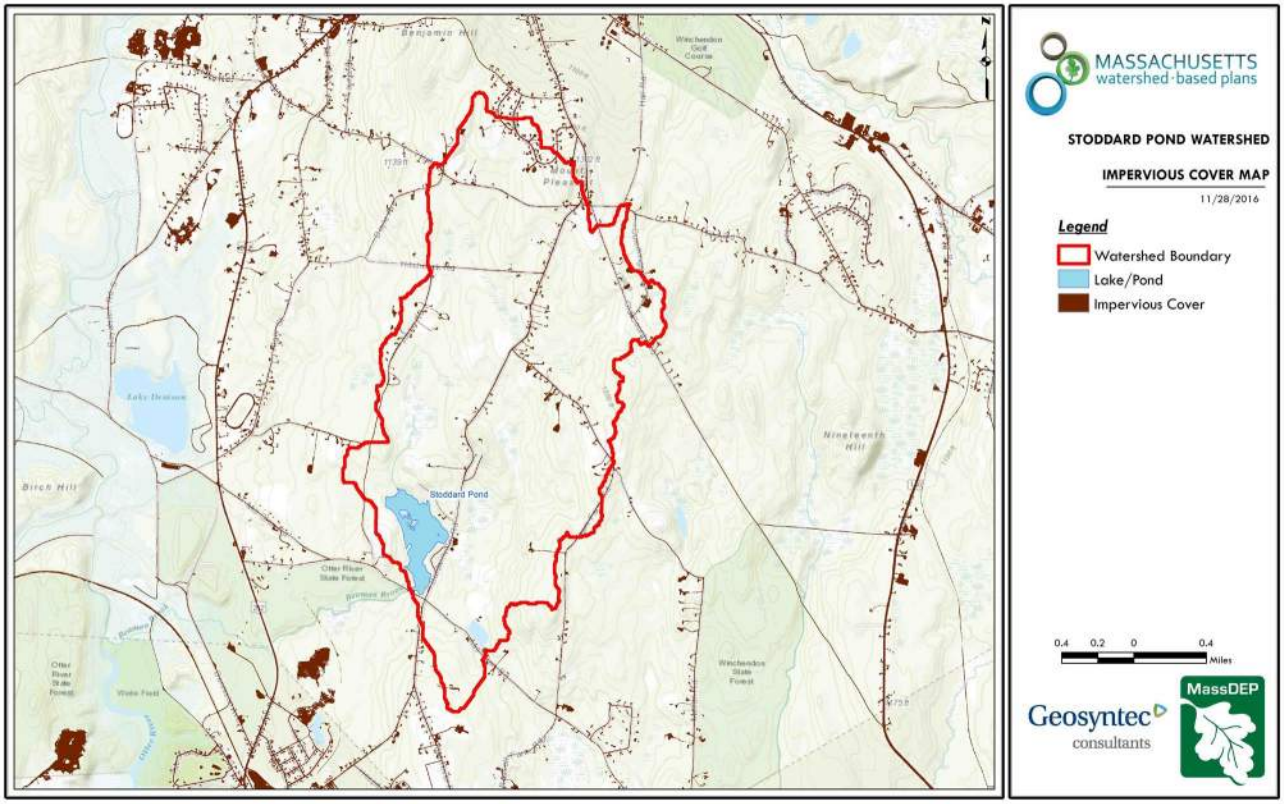

Figure A-3: Watershed Impervious Surface Map (MassGIS, 2009b; MassGIS, 1999; MassGIS, 2001; USGS, 2016)

Ctrl + Click on the map to view a full sized image in your web browser.

Land use information:

6. Pollutant Loading

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 watershed was estimated by multiplying each land use/cover type area by its pollutant load export rate (PLER). 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 (Voorhees, 2016b) (see documentation provided in Appendix A) 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)

Table A-8: Estimated Pollutant Loading for Key Nonpoint Source Pollutants

Land Use Type	Pollutant Loading[1]		
	Total Phosphorus (TP) (lbs/yr)	Total Nitrogen (TN) (lbs/yr)	Total Suspended Solids (TSS) (tons/yr)
Agriculture	51	304	4.05
Commercial	1	4	0.06
Forest	213	1,065	52.56
High Density Residential	0	0	0.00
Highway	0	0	0.00
Industrial	1	12	0.15
Low Density Residential	59	617	8.24
Medium Density Residential	0	0	0.00
Open Land	12	160	2.58
TOTAL	337	2,163	67.63

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

Pollutant loading information:

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.

1. Estimated Pollutant Loads

Table 1 lists estimated pollutant loads for the following primary nonpoint source (NPS) pollutants: total phosphorus (TP), total nitrogen (TN), total suspended solids (TSS). These estimated loads are based on the pollutant loading analysis presented in Section 4 of Element A.

2. Water Quality Goals

Water quality goals for primary NPS pollutants are listed in Table 1 based on the following:

- TMDL water quality goals (if a TMDL exists for the water body);
- For all water bodies, including impaired waters that have a pathogen 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.
- If the water body does not have a TMDL for TP, 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". Because there are no similar default water quality goals for TN and TSS, goals for these pollutants are provided in Table 1 only if a TMDL exists or alternate goal(s) have been optionally established by the WBP author.
- According to the USEPA Gold Book, total phosphorus should not exceed 50 ug/L in any stream at the point where it enters any lake or reservoir. The water quality loading goal was estimated by multiplying this target maximum phosphorus concentration (50 ug/L) by the estimated annual watershed discharge for the selected water body. To estimate the annual watershed discharge, the mean flow was used, which was estimated based on United States Geological Survey (USGS) "Runoff Depth" estimates for Massachusetts (Cohen and Randall, 1998). Cohen and Randall (1998) provide statewide estimates of annual Precipitation (P), Evapotranspiration (ET), and Runoff (R) depths for the northeastern U.S. According to their method, Runoff Depth (R) is defined as all water reaching a discharge point (including surface and groundwater), and is calculated by:

$$P - ET = R$$

A mean Runoff Depth R was determined for the watershed by calculating the average value of R within the watershed boundary. This method includes the following assumptions/limitations:

a. For lakes and ponds, the estimate of annual TP loading is averaged across the entire watershed. However, a given lake or reservoir may have multiple tributary streams, and each stream may drain land with vastly different characteristics. For example, one tributary may drain a highly developed residential area, while a second tributary may drain primarily forested and undeveloped land. In this case, one tributary may exhibit much higher phosphorus concentrations than the average of all streams in the selected watershed.

b. The estimated existing loading value only accounts for phosphorus due to stormwater runoff. Other sources of phosphorus may be relevant, particularly phosphorus from on-site wastewater treatment (septic systems) within close proximity to receiving waters. Phosphorus does not typically travel far within an aquifer, but in watersheds that are primarily unsewered, septic systems and other similar groundwater-related sources may contribute a significant load of phosphorus that is not captured in this analysis. As such, it is important to consider the estimated TP loading as "the expected TP loading from stormwater sources."

Table B-1: Pollutant Load Reductions Needed

Pollutant	Existing Estimated Total Load	Water Quality Goal	Required Load Reduction
Total Phosphorus	See TMDL information below	See TMDL information below	See TMDL information below
Total Nitrogen	2163 lbs/yr		
Total Suspended Solids	68 ton/yr		
Bacteria	*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.	

TMDL Pollutant Load Criteria

Total Phosphorus (MA35083)

Modeling Assumptions, Key Input, Calibration and Validation:

There are no numeric models available to predict the growth of rooted aquatic macrophytes as a function of nutrient loading estimates, therefore the control of nuisance aquatic plants is based on best professional judgment. However, as previously stated, the goal of the TMDL is to prevent future eutrophication from occurring, thus the nutrient loading still needs to be controlled. To control eutrophication, the Carlson Trophic State Index (TSI) (Carlson,1977) predicts a lake should have total phosphorus concentrations of about 40 ppb to meet the 4-foot transparency requirement for swimming beaches in Massachusetts and targets are set lower than this. Due to the lack of data on mean depth and other parameters, a simple water quality model was used to link watershed phosphorus loading to in-lake total phosphorus concentration targets. Based on the NPSLAKE model phosphorus loading output and predicted water runoff volumes, an estimated in-lake total phosphorus (TP) concentration was derived based on the Reckhow (1979) model:

$TP=L/(11.6+1.2*q)*1000$

where TP= the predicted average total phosphorus concentration (mg/l) in the lake.
L= Phosphorus loading in g/m2/yr (the total loading in grams divided by lake area in meters).
q= The areal water loading in m/yr from total water runoff in m3/yr divided by lake area in m2.

Similarly, by setting the TP to the target total phosphorus concentration, a target load was estimated by solving the equation above. As noted in Mattson and Isaac (1999) the Reckhow (1979) model was developed on similar, north temperate lakes and most Massachusetts lakes will fall within the range of phosphorus loading and hydrology of the calibration data set. Additional assumptions, and details of calibration and validation are given in Reckhow (1979).

Wasteload Allocations, Load Allocations and Margin of Safety:

For most lakes, point source wasteload allocation is zero since no point sources have been identified. For lakes with permitted point sources the loading is based on flow and concentrations reported in the DMR reports. The margin of safety is set by establishing a target that is below that expected to meet the 4-foot swimming standard (about 40 ppb). Thus, the TMDL is the same as the target load allocation to nonpoint sources as indicated in the right side of the following table (from “Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes”, 2003). Loading allocations are based on the NPSLAKE of DEP landuse modeled phosphorus budget. Note that some lakes have surface TP concentrations that are much larger than those predicted by the NPSLAKE. It is difficult to determine the cause of the discrepancy because only one data point was available for each lake and that one sample may not be representative of the lake. If further sampling confirms a discrepancy in these lakes, internal sources of phosphorus, such as the sediments, may also be a contributing source of phosphorus to the surface waters and should be considered for further evaluation and control.

Table . Stoddard Pond MA35083 TMDL Load Allocation.

Source	*Current TP Loading (kg/yr)*	*Target TP Load Allocation (kg/yr)*
Load Allocation		
Forest	80	80
Agriculture	21	10
Open Land	14	7
Residential (Low den.)	11	5
Septic System	11	5
Other	0	0
Waste Load Allocation		
Comm. Indust.	36	17
Residential (High den.)	6	3
Total Inputs	179	127

Phosphorus loading allocations for each landuse category are shown (rounded to the nearest kg/yr) in the table. No reduction in forest loading is targeted, because other than logging operations, which are relatively rare and already have BMPs in place, this source is unlikely to be reduced by additional BMPs. The remaining load reductions are allocated as a proportional phosphorus loading reduction (except as noted below).

The TMDL is the sum of the wasteload allocations (WLA) from point sources (e.g., sewage treatment plants) plus load allocations (LA) from nonpoint sources (e.g., landuse sources) plus a margin of safety (MOS). Thus, the TMDL can be written as:

TMDL = WLA + LA + MOS

In some cases, such as Whites Mill Pond, some reduction in loading from the forest was required to attain the target TMDL. In the case of Whitney Pond the in-lake concentration was much higher than the NPSLAKE model predicted (0.037 mg/l vs. 0.018mg/l). This may be due to errors in the model and/or unmeasured sources of phosphorus to the lake such as internal sediment sources. Although there is a build up of high concentrations of phosphorus in the bottom waters in late summer (0.88 mg/l) it is unlikely this contributes to surface total phosphorus due to the quick flushing of water provided by the Millers River and the lack of any increase in surface TP during the summer. Thus an alum treatment is not warranted in this lake at this time. Further efforts should be put into controlling phosphorus inputs from the watershed. Although cold water (less than 20C or 68F) is present in the hypolimnion there is currently little or no dissolved oxygen present there to support trout during the summer.

Seasonality: As the term implies, TMDLs are often expressed as maximum daily loads. However, as specified in 40 CFR 130.2(I), TMDLs may be expressed in other terms when appropriate. For this case, the TMDL is expressed in terms of allowable annual loadings of phosphorus. Although critical conditions occur during the summer season when weed growth is more likely to interfere with uses, water quality in many lakes is generally not sensitive to daily or short term loading, but is more a function of loadings that occur over longer periods of time (e.g. annually).

Therefore, seasonal variation is taken into account with the estimation of annual loads. In addition, evaluating the effectiveness of nonpoint source controls can be more easily accomplished on an annual basis rather than a daily basis. For most lakes, it is appropriate and justifiable to express a nutrient TMDL in terms of allowable annual loadings. The annual load should inherently account for seasonal variations by being protective of the most sensitive time of year. The most sensitive time of year in most lakes occurs during summer, when the frequency and occurrence of nuisance algal blooms and macrophyte growth are usually greatest. Therefore, because the phosphorus TMDL was established to be protective of the most environmentally sensitive period (i.e., the summer season), it will also be protective of water quality during all other seasons. Additionally, the targeted reduction in the annual phosphorus load to lakes will result in the application of phosphorus controls that also address seasonal variation. For example, certain control practices such as stabilizing eroding drainage ways or maintaining septic systems will be in place throughout the year while others will be in effect during the times the sources are active (e.g., application of lawn fertilizer). In cases of rapidly flushing (less than 14 days) lakes or impoundments downstream of point sources it may be appropriate to set seasonal limits on phosphorus inputs based on the growing season (April-October). In such cases permit limits in the winter months could be relaxed (e.g. 1 mg/l total phosphorus), provided that permit limits on total suspended solids remain in effect.

Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

Pollutant load reduction information:

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.

Table C1 presents the proposed management measures as well as the estimated pollutant load reductions and costs. The planning level cost estimates and pollutant load reduction estimates and estimates of BMP footprint were based off information obtained in the following sources and were also adjusted to 2016 values using the Consumer Price Index (CPI) (United States Bureau of Labor Statistics, 2016):

- Geosyntec Consultants, Inc. (2014);
- Geosyntec Consultants, Inc. (2015);
- King and Hagen (2011);
- Leisenring, et al. (2014);
- King and Hagen (2011);
- MassDEP (2016a);
- MassDEP (2016b);
- University of Massachusetts, Amherst (2004);
- Voorhees (2015);
- Voorhees (2016a);
- Voorhees (2016b);

Table C-1: Proposed Management Measures, Estimated Pollutant Load Reductions and Costs

Structural BMPs
No Structural BMP Data Found

Additional BMPs
No Additional BMP Data Found

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.

Table D-1 presents the funding needed to implement the management measures presented in this watershed plan. The table includes costs for structural and non-structural BMPs, operation and maintenance activities, information/education measures, and monitoring/evaluation activities.

Table D-1: Summary of Funding Needed to Implement the Watershed Plan.

Management Measures	Location	Capital Costs	Operation & Maintenance Costs	Relevant Authorities	Technical Assistance Needed	Funding Needed
Structural and Non-Structural BMPs (from Element C)						
Information/Education (see Element E)						
Monitoring and Evaluation (see Element H/I)						
					Total Funding Needed:	
Funding Sources:						

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.

Step 1: Goals and Objectives

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

Step 2: Target Audience

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

Step 3: Outreach Products and Distribution

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

Step 4: Evaluate Information/Education Program

Information and education efforts and how they will be evaluated.

Other Information

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.

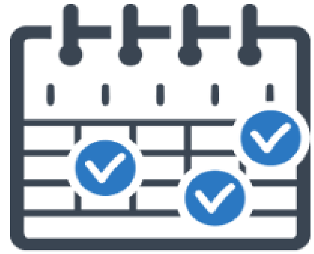

Table FG-1: Implementation Schedule and Interim Measurable Milestones

A. Structural & Non-Structural BMPs
No Data Found

B. Public Education & Outreach
No Data Found

C. Monitoring
No Data Found

Scheduling and milestone information:

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 target concentration(s) is presented under Element A of this plan. To achieve this target concentration, the annual 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 achieve 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 Gulf Pond.

Indirect Indicators of Load Reduction

Project-Specific Indicators

TMDL Criteria

Direct Measurements

Adaptive Management

References / Appendix

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Water Quality Assessment Reports

"*Millers River Watershed 2000 Water Quality Assessment Report*"

TMDL

"*Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes* "

Appendix A – Pollutant Load Export Rates (PLERs)

Land Use & Cover[1]	PLERs (lb/acre/year)		
	(TP)	(TSS)	(TN)
AGRICULTURE, HSG A	0.45	7.14	2.59
AGRICULTURE, HSG B	0.45	29.4	2.59
AGRICULTURE, HSG C	0.45	59.8	2.59
AGRICULTURE, HSG D	0.45	91.0	2.59
AGRICULTURE, IMPERVIOUS	1.52	650	11.3
COMMERCIAL, HSG A	0.03	7.14	0.27
COMMERCIAL, HSG B	0.12	29.4	1.16
COMMERCIAL, HSG C	0.21	59.8	2.41
COMMERCIAL, HSG D	0.37	91.0	3.66
COMMERCIAL, IMPERVIOUS	1.78	377	15.1
FOREST, HSG A	0.12	7.14	0.54
FOREST, HSG B	0.12	29.4	0.54
FOREST, HSG C	0.12	59.8	0.54
FOREST, HSG D	0.12	91.0	0.54
FOREST, HSG IMPERVIOUS	1.52	650	11.3
HIGH DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.27
HIGH DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.16
HIGH DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.41
HIGH DENSITY RESIDENTIAL, HSG D	0.37	91.0	3.66
HIGH DENSITY RESIDENTIAL, IMPERVIOUS	2.32	439	14.1
HIGHWAY, HSG A	0.03	7.14	0.27
HIGHWAY, HSG B	0.12	29.4	1.16
HIGHWAY, HSG C	0.21	59.8	2.41
HIGHWAY, HSG D	0.37	91.0	3.66
HIGHWAY, IMPERVIOUS	1.34	1,480	10.2
INDUSTRIAL, HSG A	0.03	7.14	0.27
INDUSTRIAL, HSG B	0.12	29.4	1.16

INDUSTRIAL, HSG C	0.21	59.8	2.41
INDUSTRIAL, HSG D	0.37	91.0	3.66
INDUSTRIAL, IMPERVIOUS	1.78	377	15.1
LOW DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.27
LOW DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.16
LOW DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.41
LOW DENSITY RESIDENTIAL, HSG D	0.37	91.0	3.66
LOW DENSITY RESIDENTIAL, IMPERVIOUS	1.52	439	14.1
MEDIUM DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.27
MEDIUM DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.16
MEDIUM DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.41
MEDIUM DENSITY RESIDENTIAL, HSG D	0.37	91.0	3.66
MEDIUM DENSITY RESIDENTIAL, IMPERVIOUS	1.96	439	14.1
OPEN LAND, HSG A	0.12	7.14	0.27
OPEN LAND, HSG B	0.12	29.4	1.16
OPEN LAND, HSG C	0.12	59.8	2.41
OPEN LAND, HSG D	0.12	91.0	3.66
OPEN LAND, IMPERVIOUS	1.52	650	11.3
[1]HSG = Hydrologic Soil Group			

Watershed-Based Plan – Lake Dennison

MASSACHUSETTS
watershed·based plans

WATERSHED-BASED PLAN

Lake Denison

April 29, 2021

Prepared By:

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Worcester, MA

Prepared For:

MassDEP
Commonwealth of Massachusetts
Department of Environmental Protection

Contents

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).

1. General Watershed Information

Table A-1: General Watershed Information

Watershed Name (Assessment Unit ID):	Lake Denison (MA35017)
Major Basin:	MILLERS
Watershed Area (within MA):	2111.1 (ac)
Water Body Size:	83 (ac)

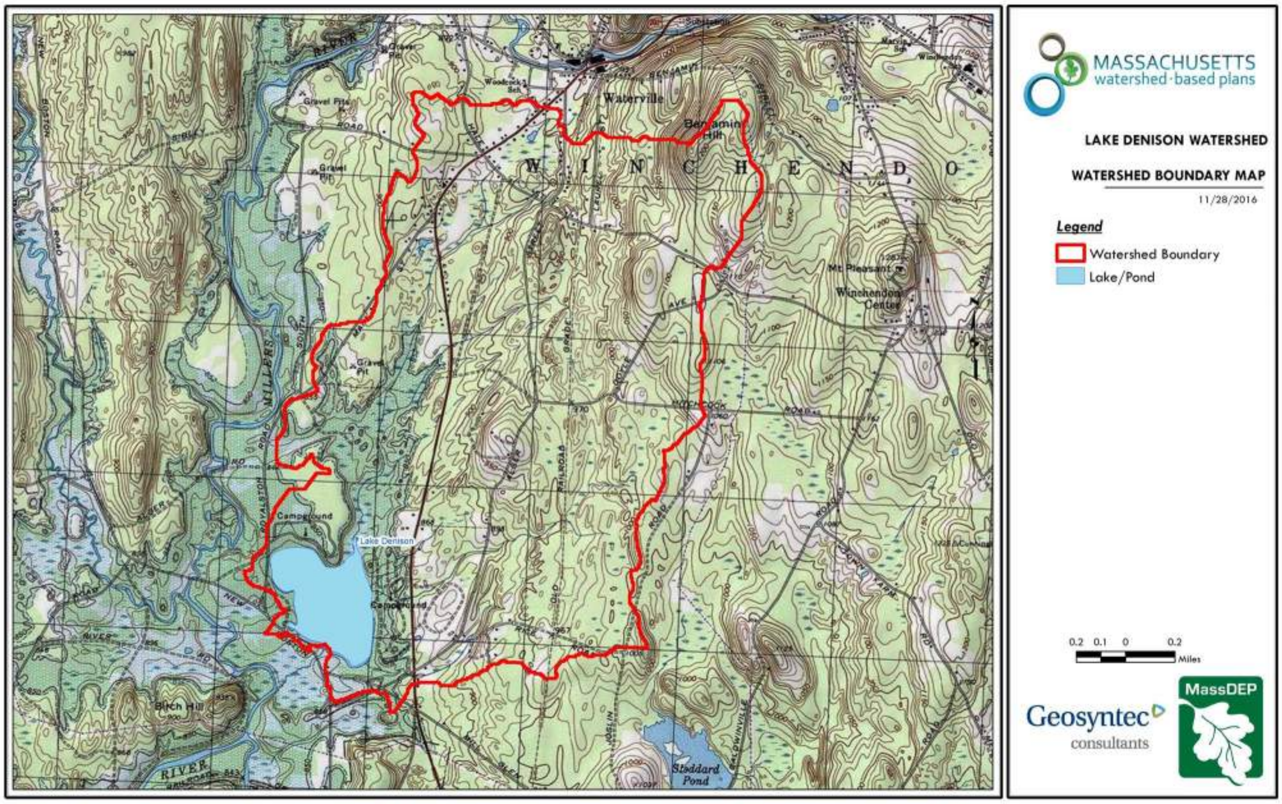

Figure A-1: Watershed Boundary Map (MassGIS, 1999; MassGIS, 2001; USGS, 2016)

Ctrl + Click on the map to view a full sized image in your web browser.

General watershed information:

2. MassDEP Water Quality Assessment Report and TMDL Review

The following reports are available:

- DIAGNOSTIC EVALUATION MANAGEMENT ALTERNATIVES AND RECOMMENDATIONS 21 COMMONWEALTH LAKES AND PONDS
- Millers River Watershed 2000 Water Quality Assessment Report
- Northeast Regional Mercury Total Maximum Daily Load
- Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

Millers River Watershed 2000 Water Quality Assessment Report (MA35017 - Lake Denison)

LAKE USE ASSESSMENTS
Lake assessments are based on information gathered during DWM surveys (recent and historic) as well as pertinent information from other reliable sources (e.g., abutters, herbicide applicators, diagnostic/feasibility studies, MA DPH, etc.). The 1995 DWM synoptic surveys focused on general observations of water quality and quantity (e.g., water level, sedimentation, etc.), the presence of native and non-native aquatic plants (as well as distribution and aerial cover), and presence/severity of algal blooms (Appendix B, Table B1). During 2000 more intensive in-lake sampling was conducted by DWM in two lakes (Stoddard and Whitney ponds) in the Millers River Watershed as part of the TMDL program. This sampling included in-lake measurements of dissolved oxygen, pH, temperature, Secchi disk transparency, nutrients, and chlorophyll a and detailed macrophyte mapping (Appendix B, Tables B2 and B3). While these surveys provided additional information to assess the status of the designated uses fecal coliform bacteria data were unavailable and, therefore, the Primary Contact Recreational Use was usually not assessed. To determine the status of the Fish Consumption Use fish consumption advisory information was obtained from the MA DPH (MA DPH 2002a). Although the Drinking Water Use was not assessed in this water quality assessment report the Class A waters were identified. Information on drinking water source protection and finish water quality is available at http://www.mass.gov/dep/brp/dws/dwshome.htm and from the Millers River Watershed's public water suppliers.

The use assessments and supporting information are entered into an EPA assessment database (either the WBS or the ADB). Data on the presence of non-native plants were entered into the MA DEP DWM informal non-native plant-tracking database.

AQUATIC LIFE
Habitat and Flow
Using guidelines developed by MA DEM to identify a river basin's stress level the Upper Naukeag Lake with a watershed drainage area of 1.90 square miles was rated at a high stress level based on the magnitude of stream flow. The criteria established for the high stress classification is net outflow equals or exceeds estimated natural August median flow (Gomez and Sullivan 2003). Because of the water withdrawals the Aquatic Life Use is identified with an Alert Status for this lake (Table 5).

Biology
Non-native aquatic macrophytes were observed in eight of the 65 lakes surveyed by DWM in 1995 and/or 2000 (Table 10 and Appendix B, Table B1). The three non-native aquatic species documented in the Millers River Watershed lakes were Myriophyllum heterophyllum (variable water milfoil), M. spicatum (Eurasian water milfoil) and Cabomba caroliniana (fanwort) (Figure 13). The mere presence of these species is considered an imbalance to the native biotic community and so these lakes are listed as impaired (808.9 acres). Additionally, these species have a high potential for spreading and are likely to have established themselves in downstream lake and river segments in the Millers River Watershed which may not have been surveyed. Figure 13 indicates where these non-native aquatic species were observed and the likely, or potential, avenues of downstream spreading.

Two non-native wetland species, Lythrum salicaria (purple loosestrife) and Phragmites australis (reed grass), were identified at three of the lakes surveyed by DWM in 1995 and/or 2000 (Table 5 and Appendix B, Table B1). Although the presence of these species is not generally a cause of impairment to lakes their invasive growth habit can result in the impairment of wetland habitat associated with lakes. Because of an unconfirmed report of a non-native species presence (Myriophyllum heterophyllum) in Sunset Lake (Ashburnham/Winchendon) the Aquatic Life Use there is identified with an Alert Status (Table 5).

Fish sampling using electrofishing, gillnetting, and shoreline seining was conducted in Stoddard and Whitney ponds in the Millers River Watershed by MA DFWELE in 2000 as part of the Lakes Survey for TMDL Development (Appendix E, Project 99-06/104). The fish sampling consisted of electrofishing at night during the spring and gillnetting and shoreline seining in the fall. A total of 10 species were collected in Stoddard Pond. The species collected, in order of abundance, were: yellow perch (Perca flavescens), golden shiner (Notemigonus crysoleucas), pumpkinseed (Lepomis gibbosus), black crappie (Pomoxis nigromaculatus), largemouth bass (Micropterus salmoides), chain pickerel (Esox niger), yellow bullhead (Ictalurus natalis), creek chubsucker (Erimyzon oblongus), brown bullhead (Ictalurus nebulosus), and bluegill (Lepomis macrochirus). A total of 13 species were collected in Whitney Pond. The species collected, in order of abundance, were: yellow perch, bluegill, black crappie, white sucker (Castosomus commersoni), pumpkinseed, golden shiner, largemouth bass, chain pickerel, creek chubsucker, brown bullhead, yellow bullhead, white perch (Morone americana), and tessellated darter (Etheostoma olmstedi).

[See figure on page 153 of Water Quality Assessment Report]

Beaver Flowage Pond

MA DFWELE conducted fish population sampling on Beaver Flowage Pond in Royalston using gillnet, angling and a barge electroshocker on August 29, 2000. Using the gillnet, a total of 62 fish represented by 7 species were collected. Fish species present, in order of abundance, were the following: largemouth bass (Micropterus salmoides), yellow perch (Perca flavescens), bluegill (Lepomis macrochirus), golden shiner (Notemigonus crysoleucas), chain pickerel (Esox niger), black crappie (Pomoxis nigromaculatus) and creek chubsucker (Erimyzon oblongus). Using angling, a total of 35 fish were collected. The most prevalent fish species was yellow perch (Perca flavescens). Other species present were black crappie (Pomoxis nigromaculatus) and bluegill (Lepomis macrochirus). Using a barge electroshocker the following species were collected: golden shiner (Notemigonus crysoleucas), yellow perch (Perca flavescens), black crappie (Pomoxis nigromaculatus), and chain pickerel (Esox niger).

Minott Pond South

Fish population sampling was conducted by MA DFWELE at the north end of South Minot Pond/Westminster on 30 August 2000. Both gillnet and angling techniques were used. With gillnetting the following species were collected: golden shiner (Notemigonus crysoleucas), yellow perch (Perca flavescens), white sucker (Catostomus commersoni), chain pickerel (Esox niger), and pumpkinseed (Lepomis gibbosus). Pumpkinseed (Lepomis gibbosus) and chain pickerel (Esox niger) were collected by angling.

Lake Rohunta (Middle Basin)

MA DFWELE conducted fish population sampling in the Middle Basin of Lake Rohunta/Orange by boat shocking on 11 August 2000. Largemouth bass (Micropterus salmoides) and golden shiner (Notemigonus crysoleucas) were the dominant species collected. Other fish species present, in order of abundance, included: bluegill (Lepomis macrochirus), yellow perch (Perca flavescens), chain pickerel (Esox niger), black crappie (Pomoxis nigromaculatus), white sucker (Catostomus commersoni), and pumpkinseed (Lepomis gibbosus).

White Pond

White Pond in Athol was sampled by MA DFWELE using both gillnetting and angling on 28 July 2000. The fish population sample from angling was dominated by bluegill (Lepomis macrochirus). Other species present included: yellow perch (Perca flavescens), pumpkinseed (Lepomis gibbosus), black crappie (Pomoxis nigromaculatus), and largemouth bass (Micropterus salmoides). Using gillnetting the dominant species was chain pickerel (Esox niger). Other fish species that were collected included: white sucker (Catostomus commersoni), largemouth bass (Micropterus salmoides), yellow perch (Perca flavescens), brown bullhead (Ameiurus nebulosus), and black crappie (Promoxis nigromaculatus).

Tully Lake

On 12 September 2000 MA DFWELE conducted fish population sampling on Tully Lake in Royalston. A total of 220 fish were collected using boat shocking. The most dominant species was yellow perch (Perca flavescens), followed by largemouth bass (Micropterus salmoides), bluegill (Lepomis macrochirus), pumpkinseed (Lepomis gibbosus), and chain pickerel (Esox niger). Other species present included: black crappie (Pomoxis nigromaculatus), golden shiner (Notemigonus crysoleucas) and creek chubsucker (Erimyzon oblongus).

Snake Pond

Fish population sampling was conducted by MA DFWELE on Snake Pond in Gardner on 15 August 2000. Yellow perch (Perca flavescens) was the dominant species collected by gillnetting while largemouth bass (Micropterus salmoides) was the dominant species collected by angling. Other species present included pumpkinseed (Lepomis gibbosus) and chain pickerel (Esox niger).

Martin Lake

Yellow perch (Perca flavescens) was the dominant fish species found in Martin Lake/Winchendon in sampling conducted by MA DFWELE. Both angling and gillnetting were used to collect fish on 17 July 2000.

Chemistry – tissue

Beaver Flowage Pond (Beaver Pond)

A total of four fish were collected from this pond in September 1999. These included a 4-year old brown bullhead and three yellow perch (two of which were estimated as 9-year olds and one was not aged). The total PCB concentrations in the "whole fish" samples of these fish ranged from 47 to 214 ppb wet weight (ENSR 2000). None of these "whole fish" samples had levels of total PCB that exceeded the NAS/NAE guideline for total PCB (Coles 1998) of 500 ppb wet weight for the protection of fish-eating wildlife.

Lake Denison

A total of three fish were collected from this pond in October 1999. These included a 7-year old yellow perch and two 5-year old largemouth bass. The total PCB concentrations in the "whole fish" samples of these fish ranged from 227 to 1,245 ppb wet weight (ENSR 2000). Both of the largemouth bass samples had levels of total PCB that exceeded (2.0 and 2.5 times) the NAS/NAE guideline for total PCB (Coles 1998) of 500 ppb wet weight for the protection of fish-eating wildlife.

Chemistry-water

Oxygen depletion occurred below 1.0 m in September 2000 in both Whitney and Stoddard ponds (Appendix B, Table B2). However, it is suspected that these ponds are highly influenced by wetland drainage as evidenced by high color values and low pH and alkalinity and, therefore, these low dissolved oxygen conditions may be naturally occurring. The total phosphorus concentrations were moderately high and the deep-water samples show evidence of phosphorus release due to the anoxic conditions in Whitney Pond. Total phosphorus concentrations were low to moderately high in Stoddard Pond. Despite these results, there are too little data (some data were censored) to assess the status of the Aquatic Life Uses for either of these ponds. Because oxygen depletion occurs at such shallow depth, however, this use is identified with an Alert Status for both ponds. Additional data/information needs to be researched to determine if these conditions are naturally occurring or anthropogenically induced.

Chemistry-sediment

Surficial sediment sampling was conducted at two lakes (Beaver Flowage Pond in Royalston and Lake Denison in Winchendon) in August 1999. Sediment samples were collected from three stations at each waterbody and analyzed for PCBs. None of the samples had detectable levels of PCBs (ENSR 2000).

The Aquatic Life Use was assessed as impaired in eight lakes (including the three basins of Lake Rohunta) based on the confirmed presence of non-native macrophyte(s) representing a total of 808.9 acres (Table 5). While Stoddard and Whitney ponds in Winchendon were not assessed for the Aquatic Life Use the use was identified with an Alert Status because of oxygen depletion at shallow depth and slight to moderately elevated phosphorus concentrations (Appendix B, Table B2). Crystal Lake in Gardner was not assessed for this use but was identified with an Alert Status because of elevated aluminum concentrations in the Gardner Water Treatment Facility discharge. Because of elevated PCB levels in “whole fish” samples the Aquatic Life Use for Lake Denison is identified with an Alert Status (Table 5). The Aquatic Life Use is also identified with an Alert Status in Sunset Lake since there is an unconfirmed report of a non-native species (Myriophyllum heterophyllum). The remaining 57 lakes, representing 3,185.1 acres, in the Millers River Watershed were not assessed for the Aquatic Life Use because of the cursory nature of the 1995 synoptic surveys and/or the lack of dissolved oxygen data and other more recent observations.

FISH CONSUMPTION

In July 2001 MA DPH issued new consumer advisories on fish consumption and mercury contamination. The MA DPH “…is advising pregnant women, women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age to refrain from eating the following marine fish; shark, swordfish, king mackerel, tuna steak and tilefish. In addition, MA DPH is expanding its previously issued statewide fish consumption advisory which cautioned pregnant women to avoid eating fish from all freshwater bodies due to concerns about mercury contamination, to now include women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age (MA DPH 2001).” Additionally, MA DPH “…is recommending that pregnant women, women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age limit their consumption of fish not covered by existing advisories to no more than 12 ounces (or about 2 meals) of cooked or uncooked fish per week. This recommendation includes canned tuna, the consumption of which should be limited to two (2) cans per week. Very small children, including toddlers, should eat less. Consumers may wish to choose to eat light tuna rather than white or chunk white tuna, the latter of which may have higher levels of mercury (MA DPH 2001).” MA DPH’s statewide advisory does not include fish stocked by the state Division of Fisheries and Wildlife or farm-raised fish sold commercially. The advisory encompasses all freshwaters in Massachusetts and, therefore, the Fish Consumption Use for lakes in the Millers River Basin cannot be assessed as support.

Fish from a total of six lakes in the Millers River Basin were sampled in either 1994 or 1995 as part of a research and development study on mercury contamination developed by the Department’s Office of Research and Standards (ORS). The lakes included Upper Naukeag Lake (Ashburnham), Hilchey Pond (Gardner), Sheomet Lake (Warwick), Upper Reservoir (Westminster), Laurel Lake (Erving/Warwick), and Gales Pond (Warwick). Fish toxics monitoring (metals, PCB, and organochlorine pesticide in edible fillets) was conducted by DWM in Lake Rohunta (Athol/New Salem/Orange) in July 1995 and in Lake Denison (Winchendon) in August 1995 and again in June 1996. These data can be found in Appendix A, Table 14. Upper Reservoir (Westminster) was sampled again in 2001 and 2002 as part of a seasonal ORS study of mercury. Mercury concentrations in largemouth bass and yellow perch all exceeded the MA DPH action level. Upper Reservoir will continue to be sampled as part of an ongoing long-term study being conducted by DEP ORS.

Fish from two lakes, Beaver Flowage Pond and Lake Denison, were sampled in 1999 (September and October, respectively) as part of a site assessment and risk characterization of PCBs at Birch Hill Reservoir (ENSR 2000). The concentration of total PCB in four individual fish fillet samples (one brown bullhead and three yellow perch) from Beaver Flowage Pond ranged from 0.001 to 0.004 ppm wet weight. The concentration of total PCB in three individual fish fillet samples (one yellow perch and two largemouth bass) from Lake Denison ranged from 0.051 to 0.161 ppm wet weight (ENSR 2000).

The most recent MA DPH Fish Consumption List recommends the following for lakes in the Millers River Watershed (MA DPH 2002a).
Lake Denison (Winchendon) because of mercury.
1. "Children younger than 12 years, pregnant women, and nursing mothers should not eat any largemouth bass from this waterbody."
2. "The general public should limit consumption of largemouth bass from this waterbody to two meals per month."
Lake Rohunta - north, middle, south basins (Athol, New Salem, Orange) because of mercury.
1. "Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from this water body."
2. "The general public should limit consumption of all fish from this water body to two meals per month."
Gales Pond (Warwick) because of mercury.
1. "Children younger than 12 years, pregnant women, and nursing mothers should not eat any yellow perch from this waterbody."
2. "The general public should limit consumption of yellow perch from this waterbody to two meals per month."
Upper Naukeag Lake (Ashburnham) because of mercury.
1. "Children younger than 12 years, pregnant women, and nursing mothers should not eat any small mouth bass or yellow perch from this waterbody."
2. "The general public should limit consumption of small mouth bass or yellow perch from this waterbody to two meals per month."
Upper Reservoir (Westminster) because of mercury.
1. "Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from this water body."
2. "The general public should limit consumption of all fish from this water body to two meals per month."
Additionally, the Millers River advisory is also in place and covers Whitney Pond (all towns from Erving to Winchendon) because of mercury and PCBs.
1. "Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from this waterbody and its tributaries."
2. "The general public should not consume any brown trout or American eel taken from this waterbody downstream from its confluence with the Otter River."
3. "The general public should limit consumption of all non-affected fish from this waterbody and its tributaries to two meals per month."

Eight lakes (including the above mentioned six lakes plus the other two basins of Lake Rohunta), representing a total of 956 acres, are assessed as impaired (due to mercury contamination) for the Fish Consumption Use (Table 5). The remaining 57 lakes, representing 3,038 acres, are not assessed for the Fish Consumption Use. It should be noted, however, that the Fish Consumption Use for Lake Monomonac is identified with an Alert Status because of elevated levels of mercury in fish were reported by the NH DES (NH DES 2003). [NOTE: The MA DPH fish consumption advisory list contains the status of each water body for which an advisory has been issued. If a water body is not on the list it may be because either an advisory was not warranted or the water body has not been sampled. MA DPH's most current Fish Consumption Advisory list is available online at http://www.state.ma.us/dph/beha/fishlist.htm.] The source of mercury is unknown although atmospheric deposition is suspected.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS
In 1995 DWM conducted synoptic surveys of 64 lakes in the Millers River Watershed. These surveys included general observations of water quality and quantity, the presence of native and non-native aquatic plants (and presence/severity of algal blooms (Appendix B, Table B1). Additional data were collected in two of these lakes by DWM in 2000 for the purpose of TMDL development. These data, combined with the 1998 303(d) List of Waters, MA DEM and public bathing beach bacteria data, MA DPH beach posting data and diagnostic/feasibility studies were used to assess the recreational and aesthetics uses.

Bacteria samples were collected at the following MA DEM beaches: Dunn Pond State Park in Gardner, Ruggles Pond in the Wendell State Forest in Wendell, Laurel Lake in the Erving State Forest in Erving/Warwick, Beamans Pond in the Otter River State Forest in Templeton/Winchendon and the Lake Denison Recreational Area in the Otter River State Park in Winchendon. With the exception of Beamans Pond none of these beaches were reported closed or posted during the 2001 or 2002 swimming season. Although it is not a named segment in this report Beamans Pond campground beach at Otter River State Forest was closed due to elevated bacteria counts between 9 and 12 July 2001. The beach was also closed between 28 and 31 May 2002 due to elevated bacteria counts (MA DPH 2001 and 2002).

Bacteria samples were collected from two town bathing beaches during the summer of 2000 and 2001 (Kendall Pond in Gardner and Lake Mattawa in Orange), however, no quality assurance data were available. Elevated fecal coliform bacteria counts were reported from Kendall Pond (City of Gardner 2002), however, no postings were reported. Due to the elevated bacteria levels detected in Kendall Pond, the Primary Contact Recreational Use is identified with an Alert Status. It should be noted, however, that a sanitary sewer project was completed in 1999 for sewering the homes around Kendall Pond (Asen 2003). A total of eight fecal coliform bacteria samples were collected from Lake Mattawa between June and September 2000. None of the counts exceeded 150 cfu/100mls and no beach closures have been reported (Town of Orange 2002). It should also be noted that the beach at Silver Lake in Athol (not a segment in this report) was closed between 2 and 9 July 2001 because of elevated bacteria counts.

The Primary and Secondary Contact Recreational and Aesthetic uses were assessed as support in five lakes (Dunn Pond, Lake Denison, Lake Mattawa, Laurel Lake, and Ruggles Pond), representing a total of 282 acres (Table 5). The Primary and Secondary Contact Recreational and Aesthetics uses are not assessed in the remaining 60 lakes (3,712 acres) in the Millers River Watershed because of a lack of bacteria, transparency and in-lake survey data.

SUMMARY
A total of 13 of the 65 lakes in the Millers River Watershed assessed in this report were impaired for either the Aquatic Life Use and/or the Fish Consumption Use (Table 5). Causes of impairment included non-native plant infestation and mercury contamination. Eight lakes, totaling 956 acres, were impaired for the Fish Consumption Use due to mercury contamination. Five lakes, totaling 282 acres, supported the Primary and Secondary Contact Recreational and Aesthetics uses. A total of 48 lakes (1,581.9 out of 3,994 acres) were not assessed for any uses.

Due to the focus of the lake surveys (synoptic surveys and surveys conducted for the TMDL program) the major cause for use impairment was non-native aquatic vegetation. Mercury contamination was also a cause for impairment. Beach closure information from MA DEM and town beaches was used to assess the recreational and aesthetics uses for the Millers River Watershed.

The fish population sample in Lake Denison (MA DFWELE sampling in September 2000) was dominated by white sucker, yellow perch and largemouth bass. Total PCB concentrations in “whole fish” samples (sampling conducted in October 1999) exceeded the NAS/NAE guideline of by a factor of 2.0 to 2.5 times (data reported in ENSR 2000). Surficial sediment screening samples collected in August 1999 at three sites in the deep hole, total PCB concentrations <2 ppm (ENSR 2000). Because of the elevated PCB in “whole fish” which exceeded the NAS/NAE guidelines, the Aquatic Life Use is identified with an “Alert Status”. Total PCB concentrations in the edible fillets (sampling conducted in September 1999) did not exceed the MA DPH guideline of 1.0 ppm (data reported in ENSR 2000). Fish toxics monitoring was conducted by MA DEP in Lake Denison in August 1995 and June 1996. Because of elevated mercury concentrations MA DPH issued a Fish Consumption Advisory recommending that “Children younger than 12 years, pregnant women, and nursing mothers should not eat any largemouth bass from this waterbody, and the general public should limit consumption of largemouth bass from this waterbody to two meals per month.” Therefore, the Fish Consumption Use is assessed as impaired. Lake Denison has a public access site (MA DFWELE 2002) as well as a public bathing beach (Lake Denison State Recreational Area in the Otter River State Park in Winchendon). No beach closures have been reported and therefore the Recreational and Aesthetic uses are assessed as support. Lake Denison is on the 1998 303(d) List of Waters because of organic enrichment/low DO (Table 3). The TMDL of Phosphorus for this pond is to be reduced from the current estimated loading of 210 kg/year to a target load of 157 kg/year (25% reduction) (MA DEP 2002). The MRPC and FRCOG (2002) report noted underground storage tanks, sand and gravel operations and stormwater as potential nonpoint sources of pollution.

Report Recommendations:
RECOMMENDATIONS – LAKES
• Careful consideration should be given to WMA permits for the Ashburnham and Winchendon Water Departments since Upper Naukeag Lake was identified at a high stress level based on water quantity (Gomez and Sullivan 2003). Furthermore, some of the water withdrawn from Upper Naukeag Lake is transferred out of the upper Millers River subwatershed to the Otter River subwatershed, the Middle River subwatershed, and the Nashua River Basin.

• MPDH is currently reevaluating their Fish Consumption Advisory for the Millers River Watershed. MA DEP has recommended that a site-specific advisory be issued for Whitney Pond because of elevated mercury. Additional fish toxics monitoring in the lakes in the Upper Millers River and North Branch Millers River subwatersheds should be conducted (Sunset Lake, Lower Naukeag, Lake Monomonac, Lake Watatic, and Wallace Pond).

• Confirm the presence of Myriophyllum heterophyllum, which is suspected to occur in Sunset Lake (Ashburnham/Winchendon).

• Coordinate with MA DCR and/or other groups conducting lake surveys to generate quality assured lakes data. Conduct more intensive lake surveys to better determine the lake trophic and use support status and identify causes and sources of impairment. As sources are identified within lake watersheds they should be eliminated or, at least, minimized through the application of appropriate point or non-point source control techniques.

• Implement recommendations identified in the TMDLs and lake diagnostic/feasibility studies, including lake watershed surveys to identify sources of impairment. Specific recommendations from the TMDL study include the following:
 Bourn-Hadley Pond has an unregulated sand and gravel operation on the western shore. This site should be investigated to ensure that best management practices are being utilized and that it is in compliance with the Wetlands Protection Act.
 Lake Ellis has initiated a program to treat the lake with herbicides that have been effective in controlling the plants in the lake. Designated use zoning is recommended to target areas for plant control.
 South Athol Pond has a gravel operation on the eastern shore that should be investigated to ensure that best management practices are being utilized so that water quality is protected.

• In-lake management of rooted aquatic plants is recommended for the following recreational lakes that have public access and are deep enough to offer recreational opportunities such as swimming and boating: Lake Ellis, Lower Naukeag Lake, Lake Monomonac, Parker Pond and Whitney Pond. Designated use zoning is recommended to target areas for plant control (MA DEP 2002).

• Continue to review data from “Beaches Bill” required water quality testing (bacteria sampling at all formal bathing beaches) to assess the status of the recreational uses.

• Quick action is necessary to manage non-native aquatic or wetland plant species that are isolated in one or a few location(s), in order to alleviate the need for costly and potentially fruitless efforts to do so in the future. Two courses of action should be pursued concurrently. More extensive surveys need to be conducted, particularly downstream from these recorded locations to determine the extent of the infestation. And, "spot" treatments (refer to the draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts [Mattson et al. 2004] for advantages and disadvantages of each) should be undertaken to control populations at these sites. These treatments include careful hand-pulling of individual plants in small areas. In larger areas other techniques, such as selective herbicide application, may be necessary. In either case, the treatments should be undertaken prior to fruit formation and with a minimum of fragmentation of the individual plants. These actions will minimize the spreading of the populations. This draft aquatic plant report (Mattson et al. 2004) should be consulted prior to the development of any lake management plan to control non-native aquatic or wetland plant species.

• Where non-native plant infestations are more extensive, conduct additional monitoring to determine the extent of the problem. The draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson et al. 2004) should be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should be discouraged because of the propensity for some invasive species of these plants to reproduce and spread vegetatively (from cuttings).

• Prevent spreading of invasive plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and responsibility of spreading these species.

• Review the MA DEP Drinking Water Program Source Water Assessment Program evaluations are when they are completed to develop and implement recommendations for the protection of Class A lakes in the Millers River Basin including Upper Naukeag Lake, Crystal Lake, Cowee Pond and Perley Brook Reservoir.

Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

(MA35017 - Lake Denison)

Lake Denison in Winchendon is a large pond of approximately 84 acres owned by the Army Corps of Engineers but managed by DEM as a park and campground. The watershed is 74 percent forested and most of remaining watershed consists of rural (including substantial open space) and agricultural landuse with the following exceptions. Approximately 4 percent of the watershed is water and wetlands. Commercial-industrial landuse covers about 3 percent of the watershed that includes segment of MassHighways Route 202. High density residential housing covers only half a percent of the entire watershed. Population in Winchendon ranged between 7,019 and 8,805 from 1980 to the 1990 census. Miser predictions on growth are 9,637 for the year 2000 and 11,054 for the year 2010 with an estimated 20 year growth rate of about 26 percent. A total phosphorus concentrations of 0.01 mg/l was reported in July of 1986. Moderate color was noted in the report with a visibility of about 5 feet. No short term management was proposed in the Cortell report other than continued monitoring. A DEP survey in July of 1992 reported a Secchi disk transparency of 3.6m and a total phosphorus concentration of 0.032mg/l. The macrophyte survey shows sparse vegetation along the majority of the shore but several minor coves had very dense vegetation. Assessment comments reported: "Historically dense growths of aquatic macrophytes (primarily Utricularia purpurea) covering the entire littoral zone and algal "blooms" reducing transparency were not evident. Low dissolved oxygen found below 4.0 meters for part of the season. Metals and PCBs in fish tissue were analyzed on 31 Jan. 1990, but no advisory resulted." A site visit in September of 2002 by DEP staff noted clear water and very little plant cover.

No detailed study of the nutrient sources within the lake watersheds has been conducted to date. Thus, nutrient sources were estimated based on land use modeling within the DEP's NPSLAKE model. The NPSLAKE model was designed to estimate watershed loading rates of phosphorus to lakes. The phosphorus loading estimates from the model are used with estimates of water runoff and these are used as inputs into a water quality model of Reckhow (1979). A brief description of the NPSLAKE model and data inputs is given here. MassGIS digital maps of land use (1985 or 1999 when available) within the watershed were used to calculate areas of landuse within three major types: Forest, rural and urban landuse. This model takes the area in hectares of land use within each of three categories and applies an export coefficient to each to predict the annual external loading of phosphorus to the lake from the watershed. Because some of the landuse data is based on old (1985) aerial photographs, the current landuses within the watershed may be different today. This can be important in the development of the TMDL because different landuses can result in different phosphorus loadings to the waterbody in question. For many rural areas, landuse changes often result in conversion of open or agricultural lands to low density housing, in which case, the export coefficients of the NPSLAKE model are the same and no change in loading is predicted to occur. However, in cases where development changes forests to residential areas or rural landuses to urban landuses, phosphorus loadings are predicted to increase. In some cases, loadings are predicted to decrease if additional agricultural land is abandoned and forest regrowth occurs. To account for this uncertainty in landuse changes, a conservative target is chosen. In addition, the MassGIS landuse maps are scheduled to be updated with current aerial photos and the TMDL can be modified as additional information is obtained.

Other phosphorus sources, such as septic system inputs of phosphorus, are estimated from an export coefficient multiplied by the number of homes within 100 meters of the lake. Point sources are estimated manually based on discharge information and site specific information for uptake and storage. Other sources such as atmospheric deposition to lakes was determined to be small and not significant in the NPSLAKE model, perhaps because lakes tend to be sinks rather than sources of phosphorus. For similar reasons, wetlands were also not considered to be significant sources of phosphorus following. Other, non-landuse sources of phosphorus such as inputs from waterfowl were generally not included, but can be added as additional information becomes available. If large numbers of waterfowl are using the lake the total phosphorus budget may be an underestimate, and control measures should be considered.

An internal source (recycling) of phosphorus is not included because it is not considered as a net external load to the lake, but rather a seasonal recycling of phosphorus already present in the lake. In cases where this internal source is large it may result in surface concentrations higher than predicted from landuse loading models and may contribute to water quality violations during the critical summer period. As additional monitoring data become available, these lakes will be assessed for internal contributions and possibly control of these sources by alum or other means. The major sources according to the land use analysis are shown in the table below (from “Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes”, 2003).

Table Lake Denison MA35017

Total Estimated Nonpoint Source Pollution loads based on GIS Landuse

Watershed Area=	895.4 Ha (3.5 mi2)
Average Annual Water Load =	5458283.7 m3/yr (6.2 cfs)
Average Runoff=	61.0 cm/yr (24.0 in/yr)
Lake area=	33.8 Ha. (83.5ac)
Areal water loading to lake: q=	16.2 m/yr.
Homes with septic systems within 100m of lake.=	0.0
Other P inputs =	0.0 kg/yr

Estimate of annual Nonpoint Source Pollution Loads by land use

Land use	Area Ha (%)	P Load kg/yr (%)	N Load kg/yr	TSS Load kg/yr
Forest category				
Forest:	658.4 (73.5)	85.6 (40.7)	1645.9	15801.1
Rural category				
Agriculture:	27.0 (3.0)	8.1 (3.9)	133.5	3002.8
Open land:	52.1 (5.8)	15.6 (7.4)	270.7	10959.1
Residential Low:	91.2 (10.2)	27.3 (13.0)	501.4	35369.6
Other Landuses				
Water:	33.8 (3.8)	0.0 (0.0)	0.0	0.0
Wetlands:	5.5 (0.6)	0.0 (0.0)	0.0	292.5
Other P inputs:	NA	0.0 (0.0)		
0.0 Septics:	NA	0.0 (0.0)		
Urban category				
Residential High:	4.4 (0.5)	11.6 (5.5)	24.0	2032.9
Comm - Ind:	23.2 (2.6)	61.8 (29.4)	230.9	5688.5
Total	895.4 (100.0)	210.1(100)	2818.1	73302.2

Summary of Lake Total Phosphorus Modeling Results

Areal P loading L= 0.6 g/m2/yr.
Reckhow (1979) model predicts lake TP = L/(11.6+1.2q)*1000 = 20.1 ppb.
Predicted transparency = 2.4 meters.

The NPSLAKE model assumes land uses are accurately represented by the MassGIS digital maps and that land use has not changed appreciably since the maps were compiled in 1985. The predicted loading is based on the equation:

P Loading (kg/yr)= 0.5* septics + 0.13* forest ha + 0.3* rural ha + 14* (urban ha)^0.5

The coefficients of the model are based on a combination of values estimated with the aid of multiple regression on a Massachusetts data set and of typical values reported in previous diagnostic/feasibility studies in Massachusetts. All coefficients fall within the range of values reported in other studies. The overall standard error of the model is approximately 172 kg/yr. If no data is available for internal loading a rough estimate of the magnitude of this source can be estimated from the Reckhow model by substitution of the in-lake concentration for TP. The difference in predicted loadings from this approach and the landuse approach is the best estimate of internal loading.

The NPSLAKE model also generates predictions of estimated yearly average water runoff to the lake based on total watershed area and runoff maps of Massachusetts. Other estimates of nitrogen and total suspended solids (TSS) loading rates are provided here for informational and comparison purposes only.

Because of the general nature of the landuse loading approach, natural background is included in land use based export coefficients. Natural background can be estimated based on the forest export coefficient of 0.13 kg/ha/yr multiplied by the hectares of the watershed assuming the watershed to be entirely forested. Without site specific information regarding soil phosphorus and natural erosion rates the accuracy of this estimate would be uncertain and would add little value to the analysis.

A recent report on nonpoint source pollution in the Millers basin used slightly different phosphorus coefficients based on the EPA Nationwide Urban Runoff Program (NURP) to estimate loads to several of the lakes (MRPC & FRCG, 2002). Although the two estimates are correlated there is no consistent difference (bias) between the models. The nonlinear Urban landuse loading coefficient used in NPSLAKE may explain some of the variation between the models. Because the NPSLAKE model has been verified against measured loads to lakes, the NPSLAKE loads will be used as a basis for these TMDLs.

MRPC & FRCG. 2002. Assessment of Potential Nonpoint Source Pollution for the Millers River Watershed in Massachusetts. Montachusett Regional Planning Agency, Fitchburg, MA and Franklin Regional Council of Governments, Greenfield, MA. Mass DEP and US EPA.
Reckhow, K.H. 1979. Uncertainty Analysis Applied to Vollenweider's Phosphorus Loading Criteria. J. Water Poll. Control Fed. 51(8):2123-2128.

Literature review information:

3. Water Quality Impairments

Known water quality impairments, as documented in the Massachusetts Department of Environmental Protection (MassDEP) 2012 Massachusetts Integrated List of Waters, are listed below. Impairment categories from the Integrated List are as follows:

Table A-2: 2012 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.

Table A-3: Water Quality Impairments

Assessment Unit ID	Waterbody	Integrated List Category	Designated Use	Impairment Cause	Impairment Source
MA35017	**Lake Denison**	**4A**	Fish Consumption	Mercury in Fish Tissue	Atmospheric Deposition - Toxics
MA35017	**Lake Denison**	**4A**	Fish, other Aquatic Life and Wildlife	Oxygen, Dissolved	Source Unknown

4. 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. LakeDenison is a Class 'B' waterbody. The water quality goal for fecal coliform bacteria is based on the Massachusetts Surface Water Quality Standards.

Table A-4: Surface Water Quality Classification by Assessment Unit ID

Assessment Unit ID	Waterbody	Class
MA35017	Lake Denison	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.).

Table A-5: Water Quality Goals

Pollutant	Goal	Source
Total Phosphorus (TP)	The target in-lake total phosphorus concentration chosen is based on consideration of the typical concentrations expected in lakes in the region. The phosphorus ecoregion map of Griffith et al. (1994) is based on spring/fall concentrations, while the phosphorus ecoregion map of Rohm et al., (1995) is based on summer concentrations. The following table (from "Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes", 2003) shows the ecoregion expected TP concentrations for both spring and summer, and the target TP that was chosen for each lake in the Millers watershed. The TP predicted by the NPSLAKE model of DEP and the surface TP concentrations are also shown for comparison. Note that according to the Carlson Trophic State analysis (Carlson,1977) a lake should have total phosphorus concentrations of about 40 ppb to meet the 4-foot transparency requirement for swimming beaches in Massachusetts. The target should be set lower than this to allow for a margin of safety. The lower phosphorus concentrations will lessen the chance of nuisance algal blooms, which may occur as macrophyte biomass is reduced by direct controls.	Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

WBID	Lake Name	TP (ppb) range in Griffith ecoregion	TP (ppb) range in Rohm ecoregion	NPSLAKE Predicted TP (ppb)	*Surface TP data (ppb)	Selected Target TP (ppb)
MA35005	Beaver Pond	5-9	15-19	12.5	NA	12.5
MA35007	Bents Pond	5-9	15-19	33.5	60	15
MA35008	Bourn-Hadley	5-9	15-19	31.1	NA	15
MA35010	Brazell Pond	5-9	15-19	42.1	NA	15
MA35013	Cowee Pond	5-9	15-19	12.7	NA	12.7
MA35015	Davenport Pond	5-9	15-19	12.7	60	12.7
MA35017	Lake Denison	5-9	15-19	20.1	32	15
MA35018	Depot Pond	5-9	15-19	32.2	NA	15
MA35023	Ellis Pond	5-9	15-19	17.5	50	15
MA35025	Greenwood Pond 1	5-9	15-19	13.9	NA	13.9
MA35026	Greenwood Pond 2	5-9	15-19	35.5	NA	15
MA35029	Hilchey Pond	5-9	15-19	27.4	NA	19
MA35041	Lower Naukeag	5-9	15-19	14.5	20	14.5
MA35045	Minott Pond South	5-9	15-19	11.0	NA	11.0
MA35046	Minott Pond	5-9	15-19	16.6	NA	15
MA35047	Lake Monomonac	5-9	15-19	13.3	14	13.3
MA35056	Parker Pond	5-9	15-19	30.0	NA	15
MA35062	Ramsdall Pond	5-9	15-19	32.4	NA	15
MA35063	Reservoir No. 1	5-9	15-19	21.1	NA	15
MA35064	Reservoir No. 2	5-9	15-19	5.1	NA	5.1
MA35065	Riceville Pond	5-9	15-19	15.1	NA	15
MA35078	South Athol Pond	5-9	15-19	17.5	20	15
MA35083	Stoddard Pond	5-9	15-19	21.1	25	15
MA35092	Wallace Pond	5-9	15-19	13.7	NA	13.7
MA35093	Ward Pond	5-9	15-19	15.4	50	15
MA35099	Whites Mill Pond	5-9	15-19	19.8	NA	15
MA35101	Whitney Pond	5-9	15-19	18.5	37	15
MA35104	Wrights Reservoir	5-9	15-19	13.5	60	13.5

NA=Not Available

Shallow nutrient rich sediments offer an ideal habitat for natural growth of aquatic macrophytes, which provide habitat for fish and wildlife and as such complete elimination of macrophytes is neither possible nor desired. In many cases, the proliferation of aquatic macrophytes in the pond is a natural condition resulting from nutrient rich riparian soils being flooded when streams and lakes were dammed for hydropower. Thus reducing the supply of external phosphorus may not meet the goals of the TMDL without additional management in the lake.

For the table, Griffith ecoregions are based on Griffith et al. (1994). Rohm ecoregions are based on Rohm et al., (1995). Latest surface total phosphorus concentrations are based on survey data. Note: Recent surveys in 2000 have total phosphorus methods which can detect low concentrations accurately with a method detection limit of 5 ppb. The remaining early (pre-1990) survey TP concentrations have a detection limit of approximately 50 ppb, and values reported for these lakes that are less than this detection limit are suspect.

	In cases where the NPSLAKE model predicted current total phosphorus concentrations lower than the ecoregion targets, we chose to maintain the lower current total phosphorus concentrations as the final target. Lakes with higher TP than the model estimates may have unknown sources or internal sources of phosphorus. Carlson, R.E. 1977. A Trophic State Index for Lakes. Limnol. Oceanogr. 22(2):361-369. Griffith, G.E., J.M. Omernik, S.M. Pierson, and C.W. Kiilsgaard. 1994. Massachusetts Ecological Regions Project. USEPA Corvallis. Massachusetts DEP, DWM Publication No. 17587-74-70-6/94-D.E.P. Rohm, C.M., J.M. Omernik, and C.W. Kiilsgaard. 1995. Regional Patterns of Total Phosphorus in Lakes of the Northeastern United States. Lake and Reservoir Man. 11(1): 1-14.	
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)

Note: *There may be more than one water quality goal for bacteria due to different Massachusetts Surface Water Quality Standards Classes for different Assessment Units within the watershed.*

5. Land Use Information

A. Watershed Land Uses

Table A-6: Watershed Land Uses

Land Use	Area (acres)	% of Watershed
Agriculture	47.53	2.3
Commercial	9.9	0.5
Forest	1630.22	77.2
High Density Residential	0	0
Highway	5.64	0.3
Industrial	34.69	1.6
Low Density Residential	256.79	12.2
Medium Density Residential	0	0
Open Land	25.25	1.2

Water	101.07	4.8

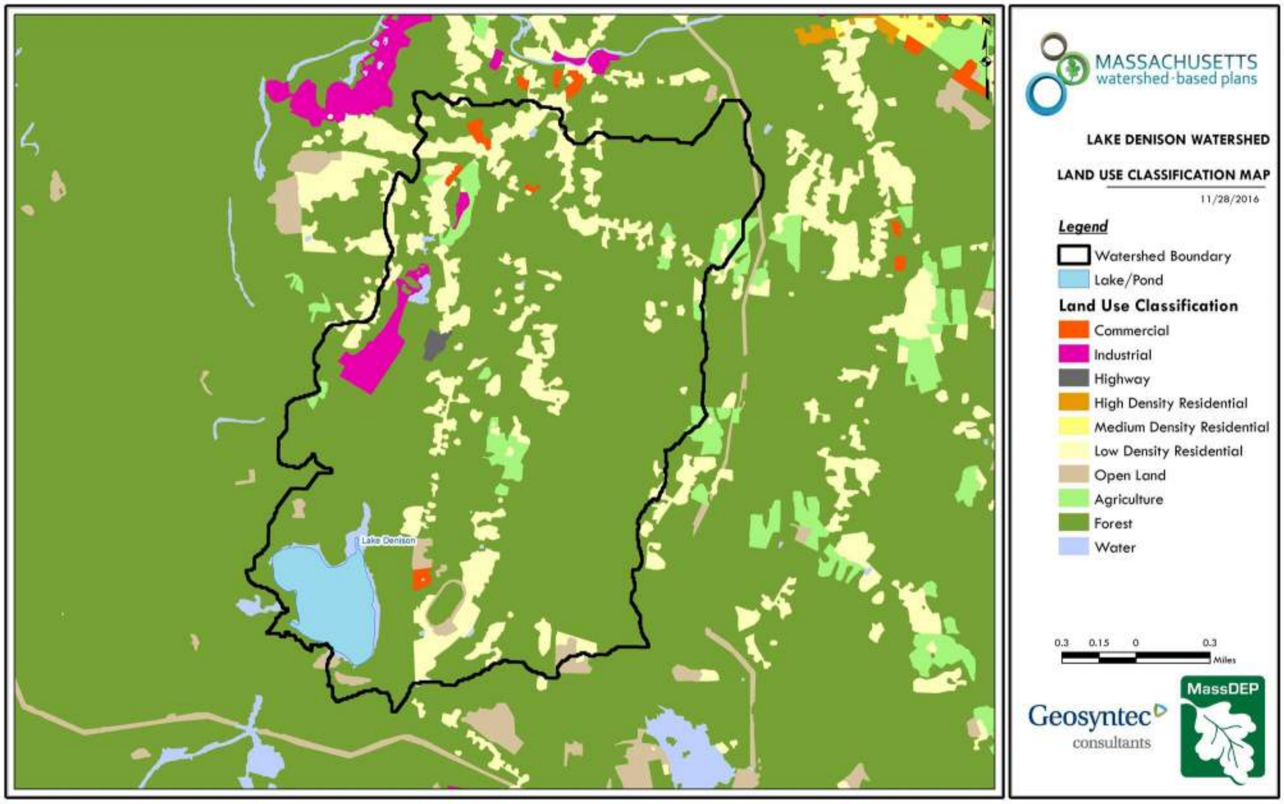

Figure A-2: Watershed Land Use Map (MassGIS, 2009b; MassGIS, 1999; MassGIS, 2001; USGS, 2016)
Ctrl + Click on the map to view a full sized image in your web browser.

B. 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 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 watershed 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.

Estimated TIA in the watershed: 5.4 %
Estimated DCIA in the watershed: 3.3 %

The relationship between TIA and water quality can generally be categorized as follows (Schueler et al. 2009):

Table A-7: 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.

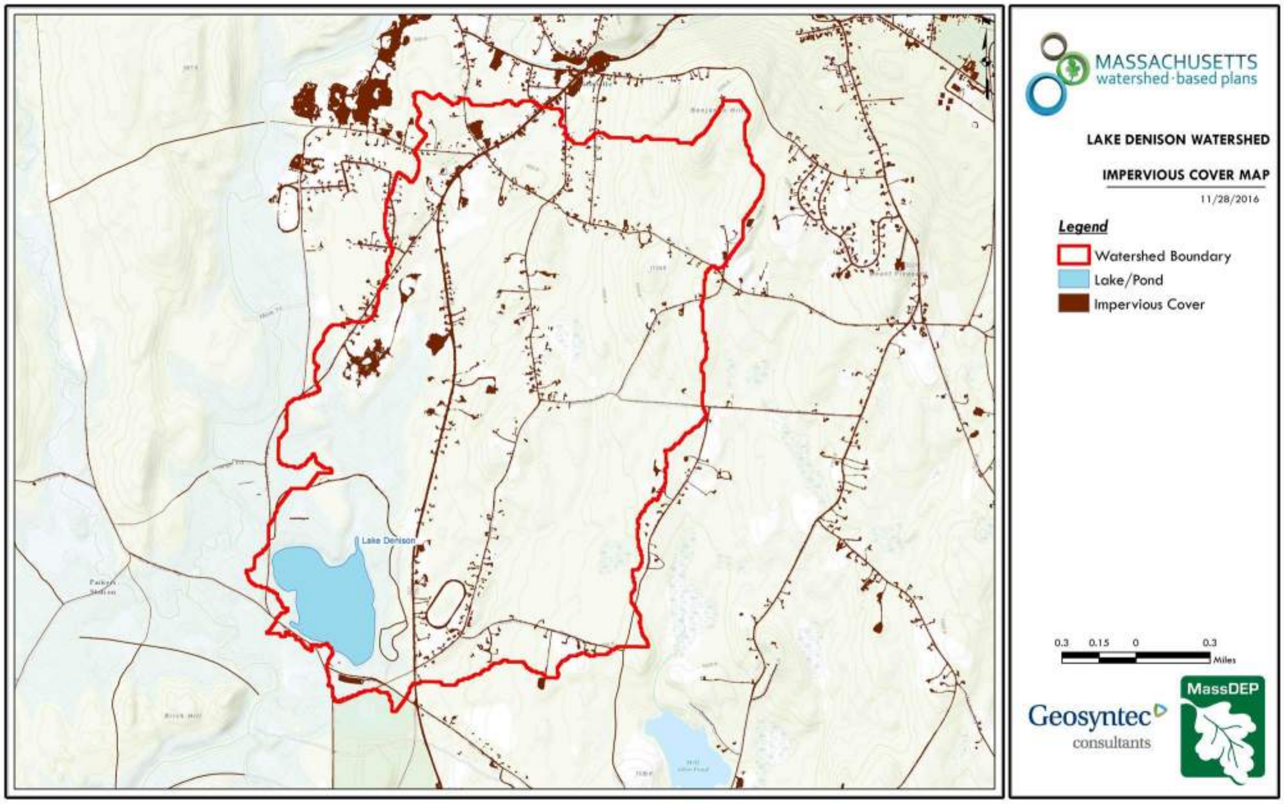

Figure A-3: Watershed Impervious Surface Map (MassGIS, 2009b; MassGIS, 1999; MassGIS, 2001; USGS, 2016)

Ctrl + Click on the map to view a full sized image in your web browser.

Land use information:

6. Pollutant Loading

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 watershed was estimated by multiplying each land use/cover type area by its pollutant load export rate (PLER). 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 (Voorhees, 2016b) (see documentation provided in Appendix A) 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)

Table A-8: Estimated Pollutant Loading for Key Nonpoint Source Pollutants

Land Use Type	Pollutant Loading[1]		
	Total Phosphorus (TP) (lbs/yr)	Total Nitrogen (TN) (lbs/yr)	Total Suspended Solids (TSS) (tons/yr)
Agriculture	24	144	1.99
Commercial	9	81	1.02
Forest	225	1,153	49.69
High Density Residential	0	0	0.00
Highway	4	29	1.89
Industrial	20	182	2.27
Low Density Residential	77	785	10.60
Medium Density Residential	0	0	0.00
Open Land	12	100	2.44
TOTAL	371	2,475	69.90

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

Pollutant loading information:

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.

1. Estimated Pollutant Loads

Table 1 lists estimated pollutant loads for the following primary nonpoint source (NPS) pollutants: total phosphorus (TP), total nitrogen (TN), total suspended solids (TSS). These estimated loads are based on the pollutant loading analysis presented in Section 4 of Element A.

2. Water Quality Goals

Water quality goals for primary NPS pollutants are listed in Table 1 based on the following:

- TMDL water quality goals (if a TMDL exists for the water body);
- For all water bodies, including impaired waters that have a pathogen 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.
- If the water body does not have a TMDL for TP, 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". Because there are no similar default water quality goals for TN and TSS, goals for these pollutants are provided in Table 1 only if a TMDL exists or alternate goal(s) have been optionally established by the WBP author.
- According to the USEPA Gold Book, total phosphorus should not exceed 50 ug/L in any stream at the point where it enters any lake or reservoir. The water quality loading goal was estimated by multiplying this target maximum phosphorus concentration (50 ug/L) by the estimated annual watershed discharge for the selected water body. To estimate the annual watershed discharge, the mean flow was used, which was estimated based on United States Geological Survey (USGS) "Runoff Depth" estimates for Massachusetts (Cohen and Randall, 1998). Cohen and Randall (1998) provide statewide estimates of annual Precipitation (P), Evapotranspiration (ET), and Runoff (R) depths for the northeastern U.S. According to their method, Runoff Depth (R) is defined as all water reaching a discharge point (including surface and groundwater), and is calculated by:

$$P - ET = R$$

A mean Runoff Depth R was determined for the watershed by calculating the average value of R within the watershed boundary. This method includes the following assumptions/limitations:

a. For lakes and ponds, the estimate of annual TP loading is averaged across the entire watershed. However, a given lake or reservoir may have multiple tributary streams, and each stream may drain land with vastly different characteristics. For example, one tributary may drain a highly developed residential area, while a second tributary may drain primarily forested and undeveloped land. In this case, one tributary may exhibit much higher phosphorus concentrations than the average of all streams in the selected watershed.

b. The estimated existing loading value only accounts for phosphorus due to stormwater runoff. Other sources of phosphorus may be relevant, particularly phosphorus from on-site wastewater treatment (septic systems) within close proximity to receiving waters. Phosphorus does not typically travel far within an aquifer, but in watersheds that are primarily unsewered, septic systems and other similar groundwater-related sources may contribute a significant load of phosphorus that is not captured in this analysis. As such, it is important to consider the estimated TP loading as "the expected TP loading from stormwater sources."

Table B-1: Pollutant Load Reductions Needed

Pollutant	Existing Estimated Total Load	Water Quality Goal	Required Load Reduction
Total Phosphorus	See TMDL information below	See TMDL information below	See TMDL information below
Total Nitrogen	2475 lbs/yr		
Total Suspended Solids	70 ton/yr		
Bacteria	*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.	

TMDL Pollutant Load Criteria

Total Phosphorus (MA35017)

Modeling Assumptions, Key Input, Calibration and Validation:

There are no numeric models available to predict the growth of rooted aquatic macrophytes as a function of nutrient loading estimates, therefore the control of nuisance aquatic plants is based on best professional judgment. However, as previously stated, the goal of the TMDL is to prevent future eutrophication from occurring, thus the nutrient loading still needs to be controlled. To control eutrophication, the Carlson Trophic State Index (TSI) (Carlson,1977) predicts a lake should have total phosphorus concentrations of about 40 ppb to meet the 4-foot transparency requirement for swimming beaches in Massachusetts and targets are set lower than this. Due to the lack of data on mean depth and other parameters, a simple water quality model was used to link watershed phosphorus loading to in-lake total phosphorus concentration targets. Based on the NPSLAKE model phosphorus loading output and predicted water runoff volumes, an estimated in-lake total phosphorus (TP) concentration was derived based on the Reckhow (1979) model:

$$TP=L/(11.6+1.2*q)*1000$$

where TP= the predicted average total phosphorus concentration (mg/l) in the lake.
L= Phosphorus loading in g/m2/yr (the total loading in grams divided by lake area in meters).
q= The areal water loading in m/yr from total water runoff in m3/yr divided by lake area in m2.

Similarly, by setting the TP to the target total phosphorus concentration, a target load was estimated by solving the equation above. As noted in Mattson and Isaac (1999) the Reckhow (1979) model was developed on similar, north temperate lakes and most Massachusetts lakes will fall within the range of phosphorus loading and hydrology of the calibration data set. Additional assumptions, and details of calibration and validation are given in Reckhow (1979).

Wasteload Allocations, Load Allocations and Margin of Safety:

For most lakes, point source wasteload allocation is zero since no point sources have been identified. For lakes with permitted point sources the loading is based on flow and concentrations reported in the DMR reports. The margin of safety is set by establishing a target that is below that expected to meet the 4-foot swimming standard (about 40 ppb). Thus, the TMDL is the same as the target load allocation to nonpoint sources as indicated in the right side of the following table (from “Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes”, 2003). Loading allocations are based on the NPSLAKE of DEP landuse modeled phosphorus budget. Note that some lakes have surface TP concentrations that are much larger than those predicted by the NPSLAKE. It is difficult to determine the cause of the discrepancy because only one data point was available for each lake and that one sample may not be representative of the lake. If further sampling confirms a discrepancy in these lakes, internal sources of phosphorus, such as the sediments, may also be a contributing source of phosphorus to the surface waters and should be considered for further evaluation and control.

Table . Lake Denison MA35017 TMDL Load Allocation.

Source	*Current TP Loading (kg/yr)*	*Target TP Load Allocation (kg/yr)*
Load Allocation		
Forest	86	86
Agriculture	8	5
Open Land	16	9
Residential (Low den.)	27	16
Septic System	0	0
Other	0	0
Waste Load Allocation		
Comm. Indust.	62	35
Residential (High den.)	12	7
Total Inputs	210	157

Phosphorus loading allocations for each landuse category are shown (rounded to the nearest kg/yr) in the table. No reduction in forest loading is targeted, because other than logging operations, which are relatively rare and already have BMPs in place, this source is unlikely to be reduced by additional BMPs. The remaining load reductions are allocated as a proportional phosphorus loading reduction (except as noted below).

The TMDL is the sum of the wasteload allocations (WLA) from point sources (e.g., sewage treatment plants) plus load allocations (LA) from nonpoint sources (e.g., landuse sources) plus a margin of safety (MOS). Thus, the TMDL can be written as:

TMDL = WLA + LA + MOS

In some cases, such as Whites Mill Pond, some reduction in loading from the forest was required to attain the target TMDL. In the case of Whitney Pond the in-lake concentration was much higher than the NPSLAKE model predicted (0.037 mg/l vs. 0.018mg/l). This may be due to errors in the model and/or unmeasured sources of phosphorus to the lake such as internal sediment sources. Although there is a build up of high concentrations of phosphorus in the bottom waters in late summer (0.88 mg/l) it is unlikely this contributes to surface total phosphorus due to the quick flushing of water provided by the Millers River and the lack of any increase in surface TP during the summer. Thus an alum treatment is not warranted in this lake at this time. Further efforts should be put into controlling phosphorus inputs from the watershed. Although cold water (less than 20C or 68F) is present in the hypolimnion there is currently little or no dissolved oxygen present there to support trout during the summer.

Seasonality: As the term implies, TMDLs are often expressed as maximum daily loads. However, as specified in 40 CFR 130.2(I), TMDLs may be expressed in other terms when appropriate. For this case, the TMDL is expressed in terms of allowable annual loadings of phosphorus. Although critical conditions occur during the summer season when weed growth is more likely to interfere with uses, water quality in many lakes is generally not sensitive to daily or short term loading, but is more a function of loadings that occur over longer periods of time (e.g. annually).

Therefore, seasonal variation is taken into account with the estimation of annual loads. In addition, evaluating the effectiveness of nonpoint source controls can be more easily accomplished on an annual basis rather than a daily basis. For most lakes, it is appropriate and justifiable to express a nutrient TMDL in terms of allowable annual loadings. The annual load should inherently account for seasonal variations by being protective of the most sensitive time of year. The most sensitive time of year in most lakes occurs during summer, when the frequency and occurrence of nuisance algal blooms and macrophyte growth are usually greatest. Therefore, because the phosphorus TMDL was established to be protective of the most environmentally sensitive period (i.e., the summer season), it will also be protective of water quality during all other seasons. Additionally, the targeted reduction in the annual phosphorus load to lakes will result in the application of phosphorus controls that also address seasonal variation. For example, certain control practices such as stabilizing eroding drainage ways or maintaining septic systems will be in place throughout the year while others will be in effect during the times the sources are active (e.g., application of lawn fertilizer). In cases of rapidly flushing (less than 14 days) lakes or impoundments downstream of point sources it may be appropriate to set seasonal limits on phosphorus inputs based on the growing season (April-October). In such cases permit limits in the winter months could be relaxed (e.g. 1 mg/l total phosphorus), provided that permit limits on total suspended solids remain in effect.

Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

Pollutant load reduction information:

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.

Table C1 presents the proposed management measures as well as the estimated pollutant load reductions and costs. The planning level cost estimates and pollutant load reduction estimates and estimates of BMP footprint were based off information obtained in the following sources and were also adjusted to 2016 values using the Consumer Price Index (CPI) (United States Bureau of Labor Statistics, 2016):

- Geosyntec Consultants, Inc. (2014);
- Geosyntec Consultants, Inc. (2015);
- King and Hagen (2011);
- Leisenring, et al. (2014);
- King and Hagen (2011);
- MassDEP (2016a);
- MassDEP (2016b);
- University of Massachusetts, Amherst (2004);
- Voorhees (2015);
- Voorhees (2016a);
- Voorhees (2016b);

Table C-1: Proposed Management Measures, Estimated Pollutant Load Reductions and Costs

Structural BMPs
No Structural BMP Data Found

Additional BMPs
No Additional BMP Data Found

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.

Table D-1 presents the funding needed to implement the management measures presented in this watershed plan. The table includes costs for structural and non-structural BMPs, operation and maintenance activities, information/education measures, and monitoring/evaluation activities.

Table D-1: Summary of Funding Needed to Implement the Watershed Plan.

Management Measures	Location	Capital Costs	Operation & Maintenance Costs	Relevant Authorities	Technical Assistance Needed	Funding Needed
Structural and Non-Structural BMPs (from Element C)						
Information/Education (see Element E)						
Monitoring and Evaluation (see Element H/I)						
					Total Funding Needed:	
Funding Sources:						

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.

Step 1: Goals and Objectives

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

Step 2: Target Audience

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

Step 3: Outreach Products and Distribution

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

Step 4: Evaluate Information/Education Program

Information and education efforts and how they will be evaluated.

Other Information

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.

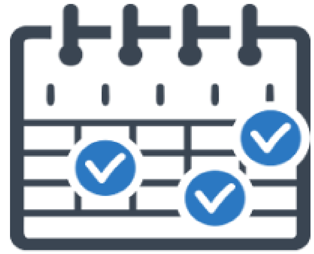

Table FG-1: Implementation Schedule and Interim Measurable Milestones

A. Structural & Non-Structural BMPs
No Data Found

B. Public Education & Outreach
No Data Found

C. Monitoring
No Data Found

Scheduling and milestone information:

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 target concentration(s) is presented under Element A of this plan. To achieve this target concentration, the annual 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 achieve 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 Gulf Pond.

Indirect Indicators of Load Reduction

Project-Specific Indicators

TMDL Criteria

Direct Measurements

Adaptive Management

References / Appendix

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Water Quality Assessment Reports

"*Millers River Watershed 2000 Water Quality Assessment Report*"

TMDL

"*Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes* "

Appendix A – Pollutant Load Export Rates (PLERs)

Land Use & Cover[1]	PLERs (lb/acre/year)		
	(TP)	(TSS)	(TN)
AGRICULTURE, HSG A	0.45	7.14	2.59
AGRICULTURE, HSG B	0.45	29.4	2.59
AGRICULTURE, HSG C	0.45	59.8	2.59
AGRICULTURE, HSG D	0.45	91.0	2.59
AGRICULTURE, IMPERVIOUS	1.52	650	11.3
COMMERCIAL, HSG A	0.03	7.14	0.27
COMMERCIAL, HSG B	0.12	29.4	1.16
COMMERCIAL, HSG C	0.21	59.8	2.41
COMMERCIAL, HSG D	0.37	91.0	3.66
COMMERCIAL, IMPERVIOUS	1.78	377	15.1
FOREST, HSG A	0.12	7.14	0.54
FOREST, HSG B	0.12	29.4	0.54
FOREST, HSG C	0.12	59.8	0.54
FOREST, HSG D	0.12	91.0	0.54
FOREST, HSG IMPERVIOUS	1.52	650	11.3
HIGH DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.27
HIGH DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.16
HIGH DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.41
HIGH DENSITY RESIDENTIAL, HSG D	0.37	91.0	3.66
HIGH DENSITY RESIDENTIAL, IMPERVIOUS	2.32	439	14.1
HIGHWAY, HSG A	0.03	7.14	0.27
HIGHWAY, HSG B	0.12	29.4	1.16
HIGHWAY, HSG C	0.21	59.8	2.41
HIGHWAY, HSG D	0.37	91.0	3.66
HIGHWAY, IMPERVIOUS	1.34	1,480	10.2
INDUSTRIAL, HSG A	0.03	7.14	0.27
INDUSTRIAL, HSG B	0.12	29.4	1.16

INDUSTRIAL, HSG C	0.21	59.8	2.41
INDUSTRIAL, HSG D	0.37	91.0	3.66
INDUSTRIAL, IMPERVIOUS	1.78	377	15.1
LOW DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.27
LOW DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.16
LOW DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.41
LOW DENSITY RESIDENTIAL, HSG D	0.37	91.0	3.66
LOW DENSITY RESIDENTIAL, IMPERVIOUS	1.52	439	14.1
MEDIUM DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.27
MEDIUM DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.16
MEDIUM DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.41
MEDIUM DENSITY RESIDENTIAL, HSG D	0.37	91.0	3.66
MEDIUM DENSITY RESIDENTIAL, IMPERVIOUS	1.96	439	14.1
OPEN LAND, HSG A	0.12	7.14	0.27
OPEN LAND, HSG B	0.12	29.4	1.16
OPEN LAND, HSG C	0.12	59.8	2.41
OPEN LAND, HSG D	0.12	91.0	3.66
OPEN LAND, IMPERVIOUS	1.52	650	11.3
[1]HSG = Hydrologic Soil Group			

Watershed-Based Plan – White’s Mill Pond

MASSACHUSETTS
watershed·based plans

WATERSHED-BASED PLAN

Whites Mill Pond

April 29, 2021

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Prepared For:

MassDEP
Commonwealth of Massachusetts
Department of Environmental Protection

Contents

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).

1. General Watershed Information

Table A-1: General Watershed Information

Watershed Name (Assessment Unit ID):	WhitesMillPond (MA35099)
Major Basin:	MILLERS
Watershed Area (within MA):	586 (ac)
Water Body Size:	42 (ac)

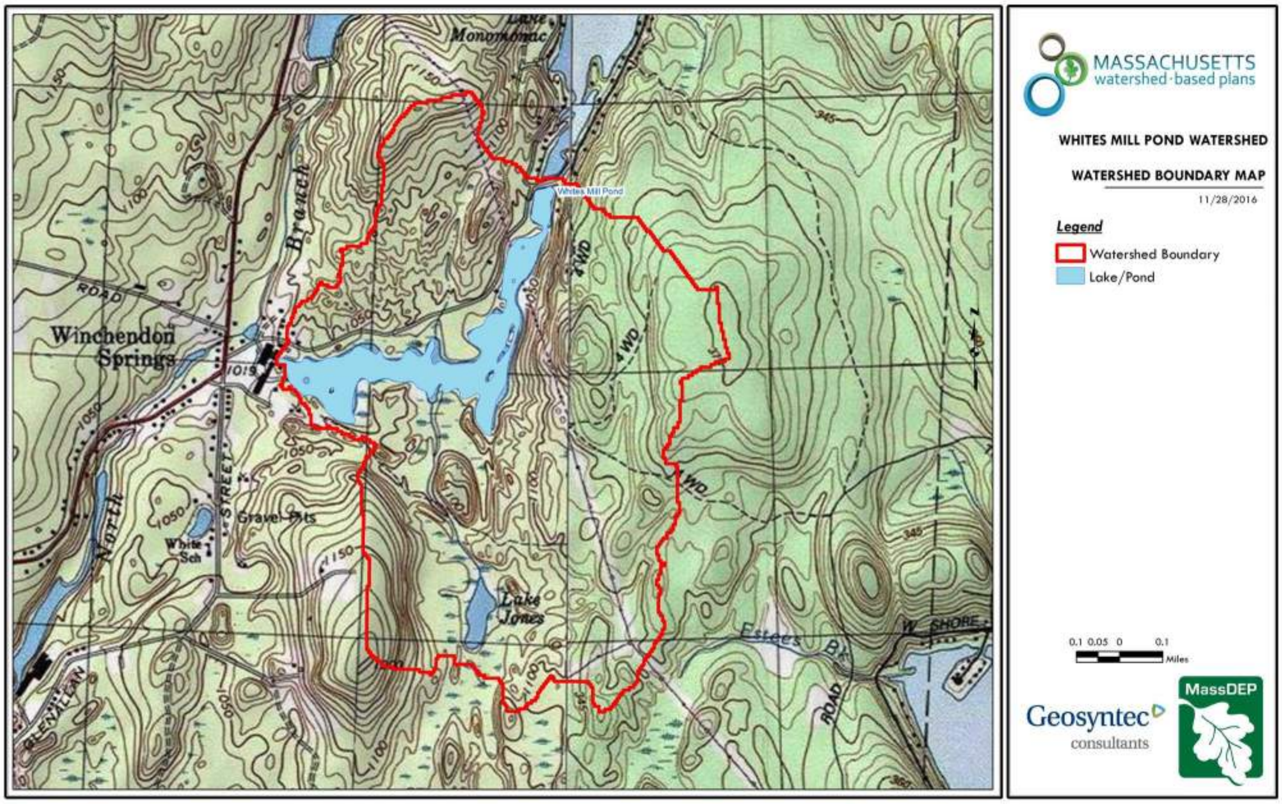

Figure A-1: Watershed Boundary Map (MassGIS, 1999; MassGIS, 2001; USGS, 2016)

Ctrl + Click on the map to view a full sized image in your web browser.

General watershed information:

2. MassDEP Water Quality Assessment Report and TMDL Review

The following reports are available:

- Millers River Watershed 2000 Water Quality Assessment Report
- Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

Millers River Watershed 2000 Water Quality Assessment Report (MA35099 - Whites Mill Pond)

LAKE USE ASSESSMENTS

Lake assessments are based on information gathered during DWM surveys (recent and historic) as well as pertinent information from other reliable sources (e.g., abutters, herbicide applicators, diagnostic/feasibility studies, MA DPH, etc.). The 1995 DWM synoptic surveys focused on general observations of water quality and quantity (e.g., water level, sedimentation, etc.), the presence of native and non-native aquatic plants (as well as distribution and aerial cover), and presence/severity of algal blooms (Appendix B, Table B1). During 2000 more intensive in-lake sampling was conducted by DWM in two lakes (Stoddard and Whitney ponds) in the Millers River Watershed as part of the TMDL program. This sampling included in-lake measurements of dissolved oxygen, pH, temperature, Secchi disk transparency, nutrients, and chlorophyll a and detailed macrophyte mapping (Appendix B, Tables B2 and B3). While these surveys provided additional information to assess the status of the designated uses fecal coliform bacteria data were unavailable and, therefore, the Primary Contact Recreational Use was usually not assessed. To determine the status of the Fish Consumption Use fish consumption advisory information was obtained from the MA DPH (MA DPH 2002a). Although the Drinking Water Use was not assessed in this water quality assessment report the Class A waters were identified. Information on drinking water source protection and finish water quality is available at http://www.mass.gov/dep/brp/dws/dwshome.htm and from the Millers River Watershed's public water suppliers.

The use assessments and supporting information are entered into an EPA assessment database (either the WBS or the ADB). Data on the presence of non-native plants were entered into the MA DEP DWM informal non-native plant-tracking database.

AQUATIC LIFE

Habitat and Flow

Using guidelines developed by MA DEM to identify a river basin's stress level the Upper Naukeag Lake with a watershed drainage area of 1.90 square miles was rated at a high stress level based on the magnitude of stream flow. The criteria established for the high stress classification is net outflow equals or exceeds estimated natural August median flow (Gomez and Sullivan 2003). Because of the water withdrawals the Aquatic Life Use is identified with an Alert Status for this lake (Table 5).

Biology

Non-native aquatic macrophytes were observed in eight of the 65 lakes surveyed by DWM in 1995 and/or 2000 (Table 10 and Appendix B, Table B1). The three non-native aquatic species documented in the Millers River Watershed lakes were Myriophyllum heterophyllum (variable water milfoil), M. spicatum (Eurasian water milfoil) and Cabomba caroliniana (fanwort) (Figure 13). The mere presence of these species is considered an imbalance to the native biotic community and so these lakes are listed as impaired (808.9 acres). Additionally, these species have a high potential for spreading and are likely to have established themselves in downstream lake and river segments in the Millers River Watershed which may not have been surveyed. Figure 13 indicates where these non-native aquatic species were observed and the likely, or potential, avenues of downstream spreading.

Two non-native wetland species, Lythrum salicaria (purple loosestrife) and Phragmites australis (reed grass), were identified at three of the lakes surveyed by DWM in 1995 and/or 2000 (Table 5 and Appendix B, Table B1). Although the presence of these species is not generally a cause of impairment to lakes their invasive growth habit can result in the impairment of wetland habitat associated with lakes. Because of an unconfirmed report of a non-native species presence (Myriophyllum heterophyllum) in Sunset Lake (Ashburnham/Winchendon) the Aquatic Life Use there is identified with an Alert Status (Table 5).

Fish sampling using electrofishing, gillnetting, and shoreline seining was conducted in Stoddard and Whitney ponds in the Millers River Watershed by MA DFWELE in 2000 as part of the Lakes Survey for TMDL Development (Appendix E, Project 99-06/104). The fish sampling consisted of electrofishing at night during the spring and gillnetting and shoreline seining in the fall. A total of 10 species were collected in Stoddard Pond. The species collected, in order of abundance, were: yellow perch (Perca flavescens), golden shiner (Notemigonus crysoleucas), pumpkinseed (Lepomis gibbosus), black crappie (Pomoxis nigromaculatus), largemouth bass (Micropterus salmoides), chain pickerel (Esox niger), yellow bullhead (Ictalurus natalis), creek chubsucker (Erimyzon oblongus), brown bullhead (Ictalurus nebulosus), and bluegill (Lepomis macrochirus). A total of 13 species were collected in Whitney Pond. The species collected, in order of abundance, were: yellow perch, bluegill, black crappie, white sucker (Castosomus commersoni), pumpkinseed, golden shiner, largemouth bass, chain pickerel, creek chubsucker, brown bullhead, yellow bullhead, white perch (Morone americana), and tessellated darter (Etheostoma olmstedi).

[See figure on page 153 of Water Quality Assessment Report]

Beaver Flowage Pond

MA DFWELE conducted fish population sampling on Beaver Flowage Pond in Royalston using gillnet, angling and a barge electroshocker on August 29, 2000. Using the gillnet, a total of 62 fish represented by 7 species were collected. Fish species present, in order of abundance, were the following: largemouth bass (Micropterus salmoides), yellow perch (Perca flavescens), bluegill (Lepomis macrochirus), golden shiner (Notemigonus crysoleucas), chain pickerel (Esox niger), black crappie (Pomoxis nigromaculatus) and creek chubsucker (Erimyzon oblongus). Using angling, a total of 35 fish were collected. The most prevalent fish species was yellow perch (Perca flavescens). Other species present were black crappie (Pomoxis nigromaculatus) and bluegill (Lepomis macrochirus). Using a barge electroshocker the following species were collected: golden shiner (Notemigonus crysoleucas), yellow perch (Perca flavescens), black crappie (Pomoxis nigromaculatus), and chain pickerel (Esox niger).

Minott Pond South

Fish population sampling was conducted by MA DFWELE at the north end of South Minot Pond/Westminster on 30 August 2000. Both gillnet and angling techniques were used. With gillnetting the following species were collected: golden shiner (Notemigonus crysoleucas), yellow perch (Perca flavescens), white sucker (Catostomus commersoni), chain pickerel (Esox niger), and pumpkinseed (Lepomis gibbosus). Pumpkinseed (Lepomis gibbosus) and chain pickerel (Esox niger) were collected by angling.

Lake Rohunta (Middle Basin)

MA DFWELE conducted fish population sampling in the Middle Basin of Lake Rohunta/Orange by boat shocking on 11 August 2000. Largemouth bass (Micropterus salmoides) and golden shiner (Notemigonus crysoleucas) were the dominant species collected. Other fish species present, in order of abundance, included: bluegill (Lepomis macrochirus), yellow perch (Perca flavescens), chain pickerel (Esox niger), black crappie (Pomoxis nigromaculatus), white sucker (Catostomus commersoni), and pumpkinseed (Lepomis gibbosus).

White Pond

White Pond in Athol was sampled by MA DFWELE using both gillnetting and angling on 28 July 2000. The fish population sample from angling was dominated by bluegill (Lepomis macrochirus). Other species present included: yellow perch (Perca flavescens), pumpkinseed (Lepomis gibbosus), black crappie (Pomoxis nigromaculatus), and largemouth bass (Micropterus salmoides). Using gillnetting the dominant species was chain pickerel (Esox niger). Other fish species that were collected included: white sucker (Catostomus commersoni), largemouth bass (Micropterus salmoides), yellow perch (Perca flavescens), brown bullhead (Ameiurus nebulosus), and black crappie (Promoxis nigromaculatus).

Tully Lake

On 12 September 2000 MA DFWELE conducted fish population sampling on Tully Lake in Royalston. A total of 220 fish were collected using boat shocking. The most dominant species was yellow perch (Perca flavescens), followed by largemouth bass (Micropterus salmoides), bluegill (Lepomis macrochirus), pumpkinseed (Lepomis gibbosus), and chain pickerel (Esox niger). Other species present included: black crappie (Pomoxis nigromaculatus), golden shiner (Notemigonus crysoleucas) and creek chubsucker (Erimyzon oblongus).

Snake Pond

Fish population sampling was conducted by MA DFWELE on Snake Pond in Gardner on 15 August 2000. Yellow perch (Perca flavescens) was the dominant species collected by gillnetting while largemouth bass (Micropterus salmoides) was the dominant species collected by angling. Other species present included pumpkinseed (Lepomis gibbosus) and chain pickerel (Esox niger).

Martin Lake

Yellow perch (Perca flavescens) was the dominant fish species found in Martin Lake/Winchendon in sampling conducted by MA DFWELE. Both angling and gillnetting were used to collect fish on 17 July 2000.

Chemistry – tissue

Beaver Flowage Pond (Beaver Pond)

A total of four fish were collected from this pond in September 1999. These included a 4-year old brown bullhead and three yellow perch (two of which were estimated as 9-year olds and one was not aged). The total PCB concentrations in the “whole fish” samples of these fish ranged from 47 to 214 ppb wet weight (ENSR 2000). None of these “whole fish” samples had levels of total PCB that exceeded the NAS/NAE guideline for total PCB (Coles 1998) of 500 ppb wet weight for the protection of fish-eating wildlife.

Lake Denison

A total of three fish were collected from this pond in October 1999. These included a 7-year old yellow perch and two 5-year old largemouth bass. The total PCB concentrations in the “whole fish” samples of these fish ranged from 227 to 1,245 ppb wet weight (ENSR 2000). Both of the largemouth bass samples had levels of total PCB that exceeded (2.0 and 2.5 times) the NAS/NAE guideline for total PCB (Coles 1998) of 500 ppb wet weight for the protection of fish-eating wildlife.

Chemistry-water
Oxygen depletion occurred below 1.0 m in September 2000 in both Whitney and Stoddard ponds (Appendix B, Table B2). However, it is suspected that these ponds are highly influenced by wetland drainage as evidenced by high color values and low pH and alkalinity and, therefore, these low dissolved oxygen conditions may be naturally occurring. The total phosphorus concentrations were moderately high and the deep-water samples show evidence of phosphorus release due to the anoxic conditions in Whitney Pond. Total phosphorus concentrations were low to moderately high in Stoddard Pond. Despite these results, there are too little data (some data were censored) to assess the status of the Aquatic Life Uses for either of these ponds. Because oxygen depletion occurs at such shallow depth, however, this use is identified with an Alert Status for both ponds. Additional data/information needs to be researched to determine if these conditions are naturally occurring or anthropogenically induced.

Chemistry-sediment
Surficial sediment sampling was conducted at two lakes (Beaver Flowage Pond in Royalston and Lake Denison in Winchendon) in August 1999. Sediment samples were collected from three stations at each waterbody and analyzed for PCBs. None of the samples had detectable levels of PCBs (ENSR 2000).

The Aquatic Life Use was assessed as impaired in eight lakes (including the three basins of Lake Rohunta) based on the confirmed presence of non-native macrophyte(s) representing a total of 808.9 acres (Table 5). While Stoddard and Whitney ponds in Winchendon were not assessed for the Aquatic Life Use the use was identified with an Alert Status because of oxygen depletion at shallow depth and slight to moderately elevated phosphorus concentrations (Appendix B, Table B2). Crystal Lake in Gardner was not assessed for this use but was identified with an Alert Status because of elevated aluminum concentrations in the Gardner Water Treatment Facility discharge. Because of elevated PCB levels in “whole fish” samples the Aquatic Life Use for Lake Denison is identified with an Alert Status (Table 5). The Aquatic Life Use is also identified with an Alert Status in Sunset Lake since there is an unconfirmed report of a non-native species (Myriophyllum heterophyllum). The remaining 57 lakes, representing 3,185.1 acres, in the Millers River Watershed were not assessed for the Aquatic Life Use because of the cursory nature of the 1995 synoptic surveys and/or the lack of dissolved oxygen data and other more recent observations.

FISH CONSUMPTION
In July 2001 MA DPH issued new consumer advisories on fish consumption and mercury contamination. The MA DPH “…is advising pregnant women, women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age to refrain from eating the following marine fish; shark, swordfish, king mackerel, tuna steak and tilefish. In addition, MA DPH is expanding its previously issued statewide fish consumption advisory which cautioned pregnant women to avoid eating fish from all freshwater bodies due to concerns about mercury contamination, to now include women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age (MA DPH 2001).” Additionally, MA DPH “…is recommending that pregnant women, women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age limit their consumption of fish not covered by existing advisories to no more than 12 ounces (or about 2 meals) of cooked or uncooked fish per week. This recommendation includes canned tuna, the consumption of which should be limited to two (2) cans per week. Very small children, including toddlers, should eat less. Consumers may wish to choose to eat light tuna rather than white or chunk white tuna, the latter of which may have higher levels of mercury (MA DPH 2001).” MA DPH’s statewide advisory does not include fish stocked by the state Division of Fisheries and Wildlife or farm-raised fish sold commercially. The advisory encompasses all freshwaters in Massachusetts and, therefore, the Fish Consumption Use for lakes in the Millers River Basin cannot be assessed as support.

Fish from a total of six lakes in the Millers River Basin were sampled in either 1994 or 1995 as part of a research and development study on mercury contamination developed by the Department’s Office of Research and Standards (ORS). The lakes included Upper Naukeag Lake (Ashburnham), Hilchey Pond (Gardner), Sheomet Lake (Warwick), Upper Reservoir (Westminster), Laurel Lake (Erving/Warwick), and Gales Pond (Warwick). Fish toxics monitoring (metals, PCB, and organochlorine pesticide in edible fillets) was conducted by DWM in Lake Rohunta (Athol/New Salem/Orange) in July 1995 and in Lake Denison (Winchendon) in August 1995 and again in June 1996. These data can be found in Appendix A, Table 14. Upper Reservoir (Westminster) was sampled again in 2001 and 2002 as part of a seasonal ORS study of mercury. Mercury concentrations in largemouth bass and yellow perch all exceeded the MA DPH action level. Upper Reservoir will continue to be sampled as part of an ongoing long-term study being conducted by DEP ORS.

Fish from two lakes, Beaver Flowage Pond and Lake Denison, were sampled in 1999 (September and October, respectively) as part of a site assessment and risk characterization of PCBs at Birch Hill Reservoir (ENSR 2000). The concentration of total PCB in four individual fish fillet samples (one brown bullhead and three yellow perch) from Beaver Flowage Pond ranged from 0.001 to

0.004 ppm wet weight. The concentration of total PCB in three individual fish fillet samples (one yellow perch and two largemouth bass) from Lake Denison ranged from 0.051 to 0.161 ppm wet weight (ENSR 2000).

The most recent MA DPH Fish Consumption List recommends the following for lakes in the Millers River Watershed (MA DPH 2002a).
Lake Denison (Winchendon) because of mercury.
1. “Children younger than 12 years, pregnant women, and nursing mothers should not eat any largemouth bass from this waterbody.”
2. “The general public should limit consumption of largemouth bass from this waterbody to two meals per month.”
Lake Rohunta - north, middle, south basins (Athol, New Salem, Orange) because of mercury.
1. “Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from this water body.”
2. “The general public should limit consumption of all fish from this water body to two meals per month.”
Gales Pond (Warwick) because of mercury.
1. “Children younger than 12 years, pregnant women, and nursing mothers should not eat any yellow perch from this waterbody.”
2. “The general public should limit consumption of yellow perch from this waterbody to two meals per month.”
Upper Naukeag Lake (Ashburnham) because of mercury.
1. “Children younger than 12 years, pregnant women, and nursing mothers should not eat any small mouth bass or yellow perch from this waterbody.”
2. “The general public should limit consumption of small mouth bass or yellow perch from this waterbody to two meals per month.”
Upper Reservoir (Westminster) because of mercury.
1. “Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from this water body.”
2. “The general public should limit consumption of all fish from this water body to two meals per month.”
Additionally, the Millers River advisory is also in place and covers Whitney Pond (all towns from Erving to Winchendon) because of mercury and PCBs.
1. “Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from this waterbody and its tributaries.”
2. “The general public should not consume any brown trout or American eel taken from this waterbody downstream from its confluence with the Otter River.”
3. “The general public should limit consumption of all non-affected fish from this waterbody and its tributaries to two meals per month.”

Eight lakes (including the above mentioned six lakes plus the other two basins of Lake Rohunta), representing a total of 956 acres, are assessed as impaired (due to mercury contamination) for the Fish Consumption Use (Table 5). The remaining 57 lakes, representing 3,038 acres, are not assessed for the Fish Consumption Use. It should be noted, however, that the Fish Consumption Use for Lake Monomonac is identified with an Alert Status because of elevated levels of mercury in fish were reported by the NH DES (NH DES 2003). [NOTE: The MA DPH fish consumption advisory list contains the status of each water body for which an advisory has been issued. If a water body is not on the list it may be because either an advisory was not warranted or the water body has not been sampled. MA DPH’s most current Fish Consumption Advisory list is available online at http://www.state.ma.us/dph/beha/fishlist.htm.] The source of mercury is unknown although atmospheric deposition is suspected.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS
In 1995 DWM conducted synoptic surveys of 64 lakes in the Millers River Watershed. These surveys included general observations of water quality and quantity, the presence of native and non-native aquatic plants (and presence/severity of algal blooms (Appendix B, Table B1). Additional data were collected in two of these lakes by DWM in 2000 for the purpose of TMDL development. These data, combined with the 1998 303(d) List of Waters, MA DEM and public bathing beach bacteria data, MA DPH beach posting data and diagnostic/feasibility studies were used to assess the recreational and aesthetics uses.

Bacteria samples were collected at the following MA DEM beaches: Dunn Pond State Park in Gardner, Ruggles Pond in the Wendell State Forest in Wendell, Laurel Lake in the Erving State Forest in Erving/Warwick, Beamans Pond in the Otter River State Forest in Templeton/Winchendon and the Lake Denison Recreational Area in the Otter River State Park in Winchendon. With the exception of Beamans Pond none of these beaches were reported closed or posted during the 2001 or 2002 swimming season. Although it is not a named segment in this report Beamans Pond campground beach at Otter River State Forest was closed due to elevated bacteria counts between 9 and 12 July 2001. The beach was also closed between 28 and 31 May 2002 due to elevated bacteria counts (MA DPH 2001 and 2002).

Bacteria samples were collected from two town bathing beaches during the summer of 2000 and 2001 (Kendall Pond in Gardner and Lake Mattawa in Orange), however, no quality assurance data were available. Elevated fecal coliform bacteria counts were reported from Kendall Pond (City of Gardner 2002), however, no postings were reported. Due to the elevated bacteria levels detected in Kendall Pond, the Primary Contact Recreational Use is identified with an Alert Status. It should be noted, however, that a sanitary sewer project was completed in 1999 for sewering the homes around Kendall Pond (Asen 2003). A total of eight fecal coliform bacteria samples were collected from Lake Mattawa between June and September 2000. None of the counts exceeded 150 cfu/100mls and no beach closures have been reported (Town of Orange 2002). It should also be noted that the beach at Silver Lake in Athol (not a segment in this report) was closed between 2 and 9 July 2001 because of elevated bacteria counts.

The Primary and Secondary Contact Recreational and Aesthetic uses were assessed as support in five lakes (Dunn Pond, Lake Denison, Lake Mattawa, Laurel Lake, and Ruggles Pond), representing a total of 282 acres (Table 5). The Primary and Secondary Contact Recreational and Aesthetics uses are not assessed in the remaining 60 lakes (3,712 acres) in the Millers River Watershed because of a lack of bacteria, transparency and in-lake survey data.

SUMMARY
A total of 13 of the 65 lakes in the Millers River Watershed assessed in this report were impaired for either the Aquatic Life Use and/or the Fish Consumption Use (Table 5). Causes of impairment included non-native plant infestation and mercury contamination. Eight lakes, totaling 956 acres, were impaired for the Fish Consumption Use due to mercury contamination. Five lakes, totaling 282 acres, supported the Primary and Secondary Contact Recreational and Aesthetics uses. A total of 48 lakes (1,581.9 out of 3,994 acres) were not assessed for any uses.

Due to the focus of the lake surveys (synoptic surveys and surveys conducted for the TMDL program) the major cause for use impairment was non-native aquatic vegetation. Mercury contamination was also a cause for impairment. Beach closure information from MA DEM and town beaches was used to assess the recreational and aesthetics uses for the Millers River Watershed.

The MRPC and FRCOG (2002) report identified a sand and gravel operation in the vicinity of Whites Mill Pond as potential nonpoint pollution source.

Report Recommendations:
RECOMMENDATIONS – LAKES
• Careful consideration should be given to WMA permits for the Ashburnham and Winchendon Water Departments since Upper Naukeag Lake was identified at a high stress level based on water quantity (Gomez and Sullivan 2003). Furthermore, some of the water withdrawn from Upper Naukeag Lake is transferred out of the upper Millers River subwatershed to the Otter River subwatershed, the Middle River subwatershed, and the Nashua River Basin.

• MPDH is currently reevaluating their Fish Consumption Advisory for the Millers River Watershed. MA DEP has recommended that a site-specific advisory be issued for Whitney Pond because of elevated mercury. Additional fish toxics monitoring in the lakes in the Upper Millers River and North Branch Millers River subwatersheds should be conducted (Sunset Lake, Lower Naukeag, Lake Monomonac, Lake Watatic, and Wallace Pond).

• Confirm the presence of Myriophyllum heterophyllum, which is suspected to occur in Sunset Lake (Ashburnham/Winchendon).

• Coordinate with MA DCR and/or other groups conducting lake surveys to generate quality assured lakes data. Conduct more intensive lake surveys to better determine the lake trophic and use support status and identify causes and sources of impairment. As sources are identified within lake watersheds they should be eliminated or, at least, minimized through the application of appropriate point or non-point source control techniques.

• Implement recommendations identified in the TMDLs and lake diagnostic/feasibility studies, including lake watershed surveys to identify sources of impairment. Specific recommendations from the TMDL study include the following:
 Bourn-Hadley Pond has an unregulated sand and gravel operation on the western shore. This site should be investigated to ensure that best management practices are being utilized and that it is in compliance with the Wetlands Protection Act.
 Lake Ellis has initiated a program to treat the lake with herbicides that have been effective in controlling the plants in the lake.

Designated use zoning is recommended to target areas for plant control.
 South Athol Pond has a gravel operation on the eastern shore that should be investigated to ensure that best management practices are being utilized so that water quality is protected.

• In-lake management of rooted aquatic plants is recommended for the following recreational lakes that have public access and are deep enough to offer recreational opportunities such as swimming and boating: Lake Ellis, Lower Naukeag Lake, Lake Monomonac, Parker Pond and Whitney Pond. Designated use zoning is recommended to target areas for plant control (MA DEP 2002).

• Continue to review data from “Beaches Bill” required water quality testing (bacteria sampling at all formal bathing beaches) to assess the status of the recreational uses.

• Quick action is necessary to manage non-native aquatic or wetland plant species that are isolated in one or a few location(s), in order to alleviate the need for costly and potentially fruitless efforts to do so in the future. Two courses of action should be pursued concurrently. More extensive surveys need to be conducted, particularly downstream from these recorded locations to determine the extent of the infestation. And, "spot" treatments (refer to the draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts [Mattson et al. 2004] for advantages and disadvantages of each) should be undertaken to control populations at these sites. These treatments include careful hand-pulling of individual plants in small areas. In larger areas other techniques, such as selective herbicide application, may be necessary. In either case, the treatments should be undertaken prior to fruit formation and with a minimum of fragmentation of the individual plants. These actions will minimize the spreading of the populations. This draft aquatic plant report (Mattson et al. 2004) should be consulted prior to the development of any lake management plan to control non-native aquatic or wetland plant species.

• Where non-native plant infestations are more extensive, conduct additional monitoring to determine the extent of the problem. The draft Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson et al. 2004) should be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should be discouraged because of the propensity for some invasive species of these plants to reproduce and spread vegetatively (from cuttings).

• Prevent spreading of invasive plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and responsibility of spreading these species.

• Review the MA DEP Drinking Water Program Source Water Assessment Program evaluations are when they are completed to develop and implement recommendations for the protection of Class A lakes in the Millers River Basin including Upper Naukeag Lake, Crystal Lake, Cowee Pond and Perley Brook Reservoir.

Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

(MA35099 - Whites Mill Pond)

Whites Mill Pond in Winchendon is a small reservoir of approximately 42 acres with a 16 foot dam located next to the Mylec Ray Plastic mill. The watershed is 81 percent forested and water and wetlands account for 10 percent. Approximately 8 percent of the watershed consists of low density residential landuse, open space accounting for the rest. Whites Mill Pond was assessed by DEP in the summer of 1995 and the assessment comments reported: " August 22, 1995 synoptic survey indicated entire upper pond and most of the lower pond covered with very dense growths of floating, submergent and emergent vegetation.” A site visit in September of 2002 by DEP staff noted the conditions were unchanged and many ducks on the pond.

No detailed study of the nutrient sources within the lake watersheds has been conducted to date. Thus, nutrient sources were estimated based on land use modeling within the DEP's NPSLAKE model. The NPSLAKE model was designed to estimate watershed loading rates of phosphorus to lakes. The phosphorus loading estimates from the model are used with estimates of water runoff and these are used as inputs into a water quality model of Reckhow (1979). A brief description of the NPSLAKE model and data inputs is given here. MassGIS digital maps of land use (1985 or 1999 when available) within the watershed were used to calculate areas of landuse within three major types: Forest, rural and urban landuse. This model takes the area in hectares of land use within each of three categories and applies an export coefficient to each to predict the annual external loading of phosphorus to the lake from the watershed. Because some of the landuse data is based on old (1985) aerial photographs, the current landuses within the watershed may be different today. This can be important in the development of the TMDL because different landuses can result in different phosphorus loadings to the waterbody in question. For many rural areas, landuse changes often result in conversion of open or agricultural lands to low density housing, in which case, the export coefficients of the NPSLAKE model are the same and no change in loading is predicted to occur. However, in cases where development changes forests to residential areas or rural landuses to urban landuses, phosphorus loadings are predicted to increase. In some cases, loadings are predicted to decrease if additional agricultural land is abandoned and forest regrowth occurs. To account for this uncertainty in landuse changes, a conservative target is chosen. In addition, the MassGIS landuse maps are scheduled to be updated with current aerial photos and the TMDL can be modified as additional information is obtained.

Other phosphorus sources, such as septic system inputs of phosphorus, are estimated from an export coefficient multiplied by the number of homes within 100 meters of the lake. Point sources are estimated manually based on discharge information and site specific information for uptake and storage. Other sources such as atmospheric deposition to lakes was determined to be small and not significant in the NPSLAKE model, perhaps because lakes tend to be sinks rather than sources of phosphorus. For similar reasons, wetlands were also not considered to be significant sources of phosphorus following. Other, non-landuse sources of phosphorus such as inputs from waterfowl were generally not included, but can be added as additional information becomes available. If large numbers of waterfowl are using the lake the total phosphorus budget may be an underestimate, and control measures should be considered.

An internal source (recycling) of phosphorus is not included because it is not considered as a net external load to the lake, but rather a seasonal recycling of phosphorus already present in the lake. In cases where this internal source is large it may result in surface concentrations higher than predicted from landuse loading models and may contribute to water quality violations during the critical summer period. As additional monitoring data become available, these lakes will be assessed for internal contributions and possibly control of these sources by alum or other means. The major sources according to the land use analysis are shown in the table below (from "Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes", 2003).

Table Whites Mill Pond MA35099

Total Estimated Pollution loads based on GIS Landuse

Watershed Area=	5087.6 Ha (19.6 mi2)
Average Annual Water Load =	31013805.6 m3/yr (35.1 cfs)
Average Runoff=	61.0 cm/yr (24.0 in/yr)
Lake area=	17.2 Ha. (42.4ac)
Areal water loading to lake: q=	180.6 m/yr.
Homes with septic systems within 100m of lake.=	9.0
Other P inputs =	0.0 kg/yr

Estimate of annual Nonpoint Source Pollution Loads by land use

Land use	Area Ha (%)	P Load kg/yr (%)	N Load kg/yr	TSS Load kg/yr
Forest category				
Forest:	4273.3 (84.0)	555.5 (71.6)	10683.3	102560.0
Rural category				
Agriculture:	227.4 (4.5)	68.2 (8.8)	2842.8	104842.0
Open land:	12.5 (0.2)	3.8 (0.5)	65.1	187.8
Residential Low:	0.0 (0.0)	0.0 (0.0)	0.0	0.0
Other Landuses				
Water:	469.2 (9.2)	0.0 (0.0)	0.0	0.0
Wetlands:	0.0 (0.0)	0.0 (0.0)	0.0	0.0
Other P inputs:	NA	0.0 (0.0)		
9.0 Septics:	NA	4.5 (0.6)		
Urban category				
Residential High:	105.1 (2.1)	143.5 (18.5)	577.9	48964.7
Comm - Ind:	0.0 (0.0)	0.0 (0.0)	0.0	0.0
Total	5087.6 (100.0)	775.5(100)	14169.1	256554.5

Summary of Lake Total Phosphorus Modeling Results

Areal P loading L= 4.5 g/m2/yr.
Reckhow (1979) model predicts lake TP = L/(11.6+1.2q)*1000 = 19.8 ppb.
Predicted transparency = 2.4 meters.

If all land were primeval forest P export would be 600.4 kg/yr
And the forested condition lake TP would be 15.3 ppb.
Thus anthropogenic inputs increase lake TP by 29.2 percent.
The Trophic State Index has increased from 43.5 to 47.2
The Lake is predicted to be mesotrophic and in a natural condition.

The NPSLAKE model assumes land uses are accurately represented by the MassGIS digital maps and that land use has not changed appreciably since the maps were compiled in 1985. The predicted loading is based on the equation:

P Loading (kg/yr)= 0.5* septics + 0.13* forest ha + 0.3* rural ha + 14* (urban ha)^0.5

The coefficients of the model are based on a combination of values estimated with the aid of multiple regression on a Massachusetts data set and of typical values reported in previous diagnostic/feasibility studies in Massachusetts. All coefficients fall within the range of values reported in other studies. The overall standard error of the model is approximately 172 kg/yr. If no data is available for internal loading a rough estimate of the magnitude of this source can be estimated from the Reckhow model by substitution of the in-lake concentration for TP. The difference in predicted loadings from this approach and the landuse approach is the best estimate of internal loading.

The NPSLAKE model also generates predictions of estimated yearly average water runoff to the lake based on total watershed area and runoff maps of Massachusetts. Other estimates of nitrogen and total suspended solids (TSS) loading rates are provided here for informational and comparison purposes only.

Because of the general nature of the landuse loading approach, natural background is included in land use based export coefficients. Natural background can be estimated based on the forest export coefficient of 0.13 kg/ha/yr multiplied by the hectares of the watershed assuming the watershed to be entirely forested. Without site specific information regarding soil phosphorus and natural erosion rates the accuracy of this estimate would be uncertain and would add little value to the analysis.

A recent report on nonpoint source pollution in the Millers basin used slightly different phosphorus coefficients based on the EPA Nationwide Urban Runoff Program (NURP) to estimate loads to several of the lakes (MRPC & FRCG, 2002). Although the two estimates are correlated there is no consistent difference (bias) between the models. The nonlinear Urban landuse loading coefficient used in NPSLAKE may explain some of the variation between the models. Because the NPSLAKE model has been verified against measured loads to lakes, the NPSLAKE loads will be used as a basis for these TMDLs.

MRPC & FRCG. 2002. Assessment of Potential Nonpoint Source Pollution for the Millers River Watershed in Massachusetts. Montachusett Regional Planning Agency, Fitchburg, MA and Franklin Regional Council of Governments, Greenfield, MA. Mass DEP and US EPA.
Reckhow, K.H. 1979. Uncertainty Analysis Applied to Vollenweider's Phosphorus Loading Criteria. J. Water Poll. Control Fed. 51(8):2123-2128.

Literature review information:

3. Water Quality Impairments

Known water quality impairments, as documented in the Massachusetts Department of Environmental Protection (MassDEP) 2012 Massachusetts Integrated List of Waters, are listed below. Impairment categories from the Integrated List are as follows:

Table A-2: 2012 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.

Table A-3: Water Quality Impairments

Assessment Unit ID	Waterbody	Integrated List Category	Designated Use	Impairment Cause	Impairment Source
MA35099	**Whites Mill Pond**	**5**	Aesthetic	Aquatic Plants (Macrophytes)	Source Unknown
MA35099	**Whites Mill Pond**	**5**	Fish Consumption	Mercury in Fish Tissue	Source Unknown
MA35099	**Whites Mill Pond**	**5**	Primary Contact Recreation	Aquatic Plants (Macrophytes)	Source Unknown
MA35099	**Whites Mill Pond**	**5**	Secondary Contact Recreation	Aquatic Plants (Macrophytes)	Source Unknown

4. 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. WhitesMillPond is a Class 'B' waterbody. The water quality goal for fecal coliform bacteria is based on the Massachusetts Surface Water Quality Standards.

Table A-4: Surface Water Quality Classification by Assessment Unit ID

Assessment Unit ID	Waterbody	Class
MA35099	Whites Mill Pond	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.).

Table A-5: Water Quality Goals

Pollutant	Goal	Source
Total Phosphorus (TP)	The target in-lake total phosphorus concentration chosen is based on consideration of the typical concentrations expected in lakes in the region. The phosphorus ecoregion map of Griffith et al. (1994) is based on spring/fall concentrations, while the phosphorus ecoregion map of Rohm et al., (1995) is based on summer concentrations. The following table (from "Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes", 2003) shows the ecoregion expected TP concentrations for both spring and summer, and the target TP that was chosen for each lake in the Millers watershed. The TP predicted by the NPSLAKE model of DEP and the surface TP concentrations are also shown for comparison. Note that according to the Carlson Trophic State analysis (Carlson,1977) a lake should have total phosphorus concentrations of about 40 ppb to meet the 4-foot transparency requirement for swimming beaches in Massachusetts. The target should be set lower than this to allow for a margin of safety. The lower phosphorus concentrations will lessen the chance of nuisance algal blooms, which may occur as macrophyte biomass is reduced by direct controls.	Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

WBID	Lake Name	TP (ppb) range in Griffith ecoregion	TP (ppb) range in Rohm ecoregion	NPSLAKE Predicted TP (ppb)	*Surface TP data (ppb)	Selected Target TP (ppb)
MA35005	Beaver Pond	5-9	15-19	12.5	NA	12.5
MA35007	Bents Pond	5-9	15-19	33.5	60	15
MA35008	Bourn-Hadley	5-9	15-19	31.1	NA	15
MA35010	Brazell Pond	5-9	15-19	42.1	NA	15
MA35013	Cowee Pond	5-9	15-19	12.7	NA	12.7
MA35015	Davenport Pond	5-9	15-19	12.7	60	12.7
MA35017	Lake Denison	5-9	15-19	20.1	32	15
MA35018	Depot Pond	5-9	15-19	32.2	NA	15
MA35023	Ellis Pond	5-9	15-19	17.5	50	15
MA35025	Greenwood Pond 1	5-9	15-19	13.9	NA	13.9
MA35026	Greenwood Pond 2	5-9	15-19	35.5	NA	15
MA35029	Hilchey Pond	5-9	15-19	27.4	NA	19
MA35041	Lower Naukeag	5-9	15-19	14.5	20	14.5
MA35045	Minott Pond South	5-9	15-19	11.0	NA	11.0
MA35046	Minott Pond	5-9	15-19	16.6	NA	15
MA35047	Lake Monomonac	5-9	15-19	13.3	14	13.3
MA35056	Parker Pond	5-9	15-19	30.0	NA	15
MA35062	Ramsdall Pond	5-9	15-19	32.4	NA	15
MA35063	Reservoir No. 1	5-9	15-19	21.1	NA	15
MA35064	Reservoir No. 2	5-9	15-19	5.1	NA	5.1
MA35065	Riceville Pond	5-9	15-19	15.1	NA	15
MA35078	South Athol Pond	5-9	15-19	17.5	20	15
MA35083	Stoddard Pond	5-9	15-19	21.1	25	15
MA35092	Wallace Pond	5-9	15-19	13.7	NA	13.7
MA35093	Ward Pond	5-9	15-19	15.4	50	15
MA35099	Whites Mill Pond	5-9	15-19	19.8	NA	15
MA35101	Whitney Pond	5-9	15-19	18.5	37	15
MA35104	Wrights Reservoir	5-9	15-19	13.5	60	13.5

NA=Not Available

Shallow nutrient rich sediments offer an ideal habitat for natural growth of aquatic macrophytes, which provide habitat for fish and wildlife and as such complete elimination of macrophytes is neither possible nor desired. In many cases, the proliferation of aquatic macrophytes in the pond is a natural condition resulting from nutrient rich riparian soils being flooded when streams and lakes were dammed for hydropower. Thus reducing the supply of external phosphorus may not meet the goals of the TMDL without additional management in the lake.

For the table, Griffith ecoregions are based on Griffith et al. (1994). Rohm ecoregions are based on Rohm et al., (1995). Latest surface total phosphorus concentrations are based on survey data. Note: Recent surveys in 2000 have total phosphorus methods which can detect low concentrations accurately with a method detection limit of 5 ppb. The remaining early (pre-1990) survey TP concentrations have a detection limit of approximately 50 ppb, and values reported for these lakes that are less than this detection limit are suspect.

In cases where the NPSLAKE model predicted current total phosphorus concentrations lower than the ecoregion targets, we chose to maintain the lower current total phosphorus concentrations as the final target. Lakes with higher TP than the model estimates may have unknown sources or internal sources of phosphorus.

Carlson, R.E. 1977. A Trophic State Index for Lakes. Limnol. Oceanogr. 22(2):361-369.
Griffith, G.E., J.M. Omernik, S.M. Pierson, and C.W. Kiilsgaard. 1994. Massachusetts

	Ecological Regions Project. USEPA Corvallis. Massachusetts DEP, DWM Publication No. 17587-74-70-6/94-D.E.P. Rohm, C.M., J.M. Omernik, and C.W. Kiilsgaard. 1995. Regional Patterns of Total Phosphorus in Lakes of the Northeastern United States. Lake and Reservoir Man. 11(1): 1-14.	
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)

Note: *There may be more than one water quality goal for bacteria due to different Massachusetts Surface Water Quality Standards Classes for different Assessment Units within the watershed.*

5. Land Use Information

A. Watershed Land Uses

Table A-6: Watershed Land Uses

Land Use	Area (acres)	% of Watershed
Agriculture	0	0
Commercial	0	0
Forest	507.12	86.5
High Density Residential	0	0
Highway	0	0
Industrial	1.17	0.2
Low Density Residential	9.49	1.6
Medium Density Residential	0	0
Open Land	26.9	4.6
Water	41.31	7.1

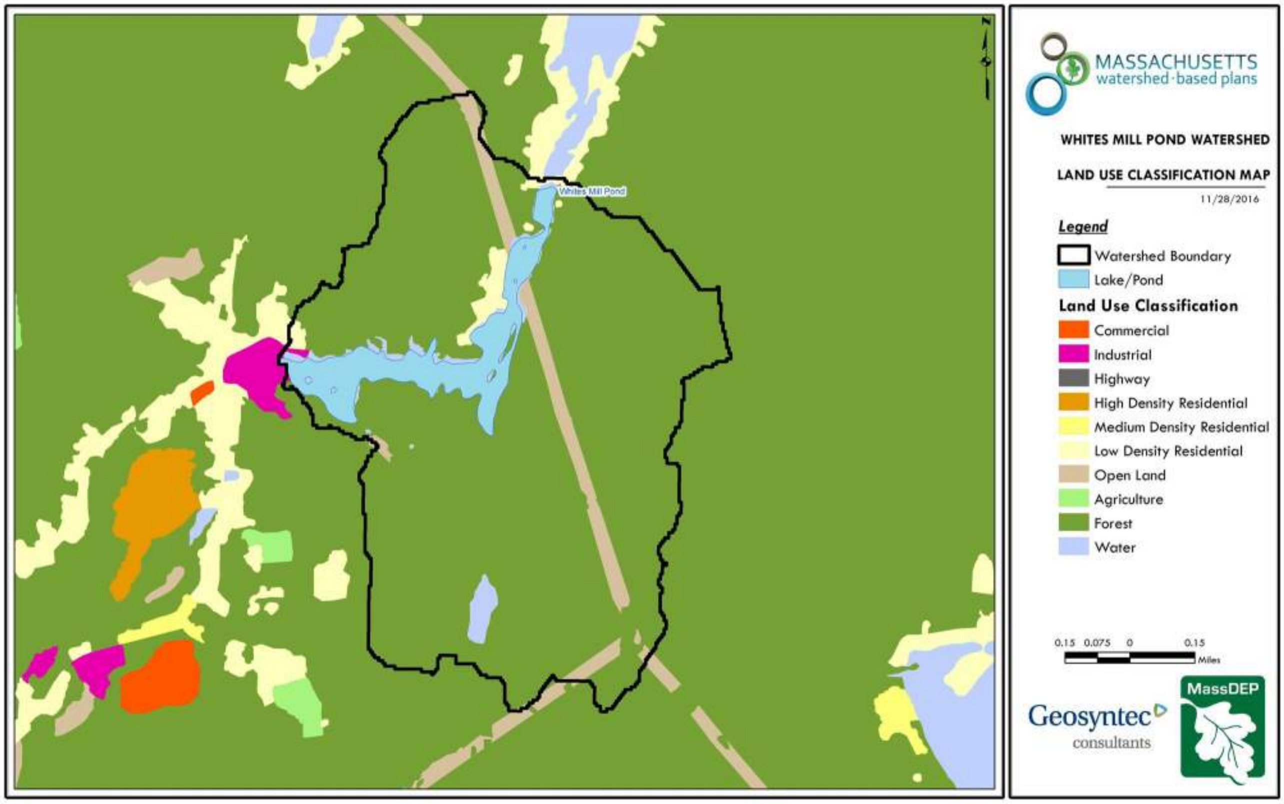

Figure A-2: Watershed Land Use Map (MassGIS, 2009b; MassGIS, 1999; MassGIS, 2001; USGS, 2016)

Ctrl + Click on the map to view a full sized image in your web browser.

B. 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 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 watershed 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.

Estimated TIA in the watershed: 0.8 %

Estimated DCIA in the watershed: 0.6 %

The relationship between TIA and water quality can generally be categorized as follows (Schueler et al. 2009):

Table A-7: 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.

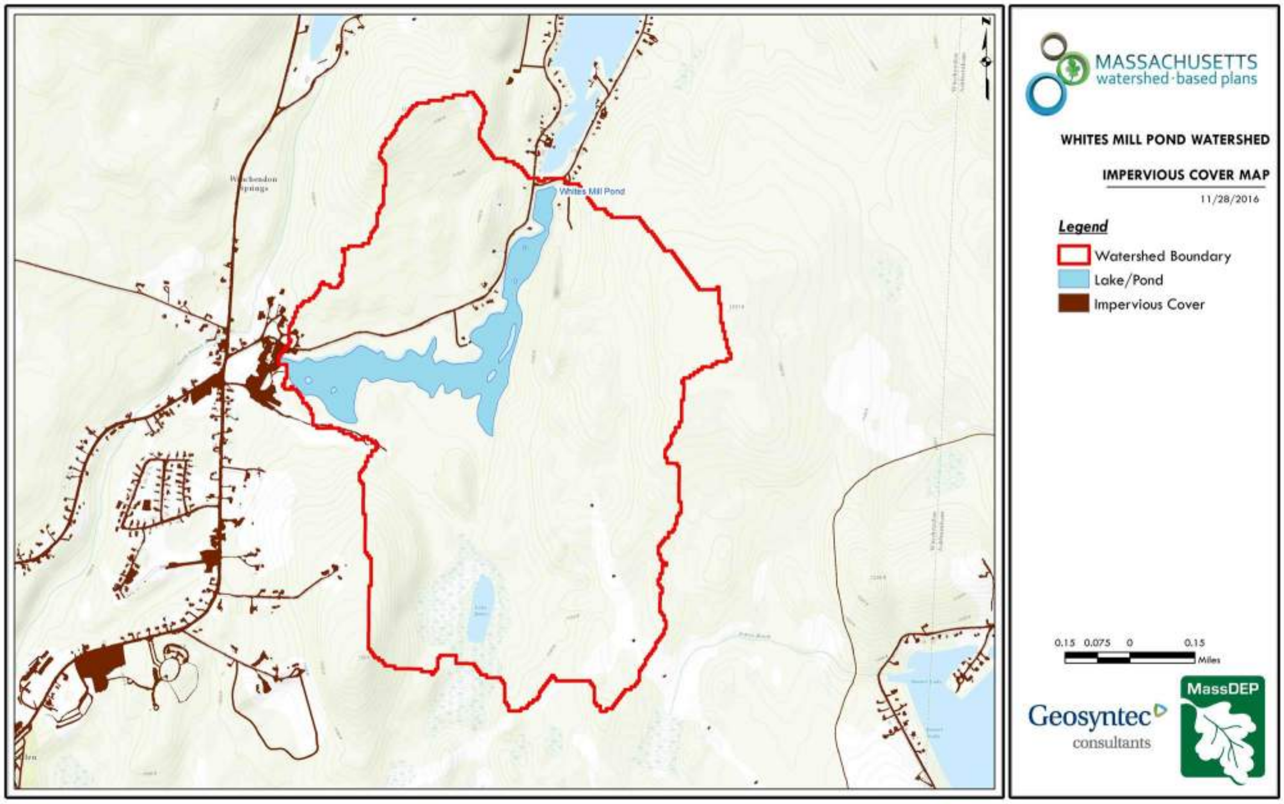

Figure A-3: Watershed Impervious Surface Map (MassGIS, 2009b; MassGIS, 1999; MassGIS, 2001; USGS, 2016)

Ctrl + Click on the map to view a full sized image in your web browser.

Land use information:

6. Pollutant Loading

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 watershed was estimated by multiplying each land use/cover type area by its pollutant load export rate (PLER). 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 (Voorhees, 2016b) (see documentation provided in Appendix A) 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)

Table A-8: Estimated Pollutant Loading for Key Nonpoint Source Pollutants

Land Use Type	Pollutant Loading[1]		
	Total Phosphorus (TP) (lbs/yr)	Total Nitrogen (TN) (lbs/yr)	Total Suspended Solids (TSS) (tons/yr)
Agriculture	0	0	0.00
Commercial	0	0	0.00
Forest	62	296	14.07
High Density Residential	0	0	0.00
Highway	0	0	0.00
Industrial	1	4	0.06
Low Density Residential	2	22	0.30
Medium Density Residential	0	0	0.00
Open Land	4	71	0.95
TOTAL	68	394	15.37

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

Pollutant loading information:

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.

1. Estimated Pollutant Loads

Table 1 lists estimated pollutant loads for the following primary nonpoint source (NPS) pollutants: total phosphorus (TP), total nitrogen (TN), total suspended solids (TSS). These estimated loads are based on the pollutant loading analysis presented in Section 4 of Element A.

2. Water Quality Goals

Water quality goals for primary NPS pollutants are listed in Table 1 based on the following:

- TMDL water quality goals (if a TMDL exists for the water body);
- For all water bodies, including impaired waters that have a pathogen 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.
- If the water body does not have a TMDL for TP, 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”. Because there are no similar default water quality goals for TN and TSS, goals for these pollutants are provided in Table 1 only if a TMDL exists or alternate goal(s) have been optionally established by the WBP author.
- According to the USEPA Gold Book, total phosphorus should not exceed 50 ug/L in any stream at the point where it enters any lake or reservoir. The water quality loading goal was estimated by multiplying this target maximum phosphorus concentration (50 ug/L) by the estimated annual watershed discharge for the selected water body. To estimate the annual watershed discharge, the mean flow was used, which was estimated based on United States Geological Survey (USGS) “Runoff Depth” estimates for Massachusetts (Cohen and Randall, 1998). Cohen and Randall (1998) provide statewide estimates of annual Precipitation (P), Evapotranspiration (ET), and Runoff (R) depths for the northeastern U.S. According to their method, Runoff Depth (R) is defined as all water reaching a discharge point (including surface and groundwater), and is calculated by:

$$P - ET = R$$

A mean Runoff Depth R was determined for the watershed by calculating the average value of R within the watershed boundary. This method includes the following assumptions/limitations:

a. For lakes and ponds, the estimate of annual TP loading is averaged across the entire watershed. However, a given lake or reservoir may have multiple tributary streams, and each stream may drain land with vastly different characteristics. For example, one tributary may drain a highly developed residential area, while a second tributary may drain primarily forested and undeveloped land. In this case, one tributary may exhibit much higher phosphorus concentrations than the average of all streams in the selected watershed.

b. The estimated existing loading value only accounts for phosphorus due to stormwater runoff. Other sources of phosphorus may be relevant, particularly phosphorus from on-site wastewater treatment (septic systems) within close proximity to receiving waters. Phosphorus does not typically travel far within an aquifer, but in watersheds that are primarily unsewered, septic systems and other similar groundwater-related sources may contribute a significant load of phosphorus that is not captured in this analysis. As such, it is important to consider the estimated TP loading as "the expected TP loading from stormwater sources."

Table B-1: Pollutant Load Reductions Needed

Pollutant	Existing Estimated Total Load	Water Quality Goal	Required Load Reduction
Total Phosphorus	See TMDL information below	See TMDL information below	See TMDL information below
Total Nitrogen	394 lbs/yr		
Total Suspended Solids	15 ton/yr		
Bacteria	*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.	

TMDL Pollutant Load Criteria

Total Phosphorus (MA35099)

Modeling Assumptions, Key Input, Calibration and Validation:

There are no numeric models available to predict the growth of rooted aquatic macrophytes as a function of nutrient loading estimates, therefore the control of nuisance aquatic plants is based on best professional judgment. However, as previously stated, the goal of the TMDL is to prevent future eutrophication from occurring, thus the nutrient loading still needs to be controlled. To control eutrophication, the Carlson Trophic State Index (TSI) (Carlson,1977) predicts a lake should have total phosphorus concentrations of about 40 ppb to meet the 4-foot transparency requirement for swimming beaches in Massachusetts and targets are set lower than this. Due to the lack of data on mean depth and other parameters, a simple water quality model was used to link watershed phosphorus loading to in-lake total phosphorus concentration targets. Based on the NPSLAKE model phosphorus loading output and predicted water runoff volumes, an estimated in-lake total phosphorus (TP) concentration was derived based on the Reckhow (1979) model:

TP=L/(11.6+1.2*q)*1000

where TP= the predicted average total phosphorus concentration (mg/l) in the lake.
L= Phosphorus loading in g/m2/yr (the total loading in grams divided by lake area in meters).
q= The areal water loading in m/yr from total water runoff in m3/yr divided by lake area in m2.

Similarly, by setting the TP to the target total phosphorus concentration, a target load was estimated by solving the equation above. As noted in Mattson and Isaac (1999) the Reckhow (1979) model was developed on similar, north temperate lakes and most Massachusetts lakes will fall within the range of phosphorus loading and hydrology of the calibration data set. Additional assumptions, and details of calibration and validation are given in Reckhow (1979).

Wasteload Allocations, Load Allocations and Margin of Safety:

For most lakes, point source wasteload allocation is zero since no point sources have been identified. For lakes with permitted point sources the loading is based on flow and concentrations reported in the DMR reports. The margin of safety is set by establishing a target that is below that expected to meet the 4-foot swimming standard (about 40 ppb). Thus, the TMDL is the same as the target load allocation to nonpoint sources as indicated in the right side of the following table (from “Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes”, 2003). Loading allocations are based on the NPSLAKE of DEP landuse modeled phosphorus budget. Note that some lakes have surface TP concentrations that are much larger than those predicted by the NPSLAKE. It is difficult to determine the cause of the discrepancy because only one data point was available for each lake and that one sample may not be representative of the lake. If further sampling confirms a discrepancy in these lakes, internal sources of phosphorus, such as the sediments, may also be a contributing source of phosphorus to the surface waters and should be considered for further evaluation and control.

Table . Whites Mill Pond MA35099 TMDL Load Allocation.

Source	*Current TP Loading (kg/yr)*	*Target TP Load Allocation (kg/yr)*
Load Allocation		
Forest	556	500
Agriculture	68	27
Open Land	4	2
Residential (Low den.)	0	0
Septic System	4	2
Other	0	0
Waste Load Allocation		
Comm. Indust.	0	0
Residential (High den.)	144	58
Total Inputs	776	589

Phosphorus loading allocations for each landuse category are shown (rounded to the nearest kg/yr) in the table. No reduction in forest loading is targeted, because other than logging operations, which are relatively rare and already have BMPs in place, this source is unlikely to be reduced by additional BMPs. The remaining load reductions are allocated as a proportional phosphorus loading reduction (except as noted below).

The TMDL is the sum of the wasteload allocations (WLA) from point sources (e.g., sewage treatment plants) plus load allocations (LA) from nonpoint sources (e.g., landuse sources) plus a margin of safety (MOS). Thus, the TMDL can be written as:

TMDL = WLA + LA + MOS

In some cases, such as Whites Mill Pond, some reduction in loading from the forest was required to attain the target TMDL. In the case of Whitney Pond the in-lake concentration was much higher than the NPSLAKE model predicted (0.037 mg/l vs. 0.018mg/l). This may be due to errors in the model and/or unmeasured sources of phosphorus to the lake such as internal sediment sources. Although there is a build up of high concentrations of phosphorus in the bottom waters in late summer (0.88 mg/l) it is unlikely this contributes to surface total phosphorus due to the quick flushing of water provided by the Millers River and the lack of any increase in surface TP during the summer. Thus an alum treatment is not warranted in this lake at this time. Further efforts should be put into controlling phosphorus inputs from the watershed. Although cold water (less than 20C or 68F) is present in the hypolimnion there is currently little or no dissolved oxygen present there to support trout during the summer.

Seasonality: As the term implies, TMDLs are often expressed as maximum daily loads. However, as specified in 40 CFR 130.2(I), TMDLs may be expressed in other terms when appropriate. For this case, the TMDL is expressed in terms of allowable annual loadings of phosphorus. Although critical conditions occur during the summer season when weed growth is more likely to interfere with uses, water quality in many lakes is generally not sensitive to daily or short term loading, but is more a function of loadings that occur over longer periods of time (e.g. annually).

Therefore, seasonal variation is taken into account with the estimation of annual loads. In addition, evaluating the effectiveness of nonpoint source controls can be more easily accomplished on an annual basis rather than a daily basis. For most lakes, it is appropriate and justifiable to express a nutrient TMDL in terms of allowable annual loadings. The annual load should inherently account for seasonal variations by being protective of the most sensitive time of year. The most sensitive time of year in most lakes occurs during summer, when the frequency and occurrence of nuisance algal blooms and macrophyte growth are usually greatest. Therefore, because the phosphorus TMDL was established to be protective of the most environmentally sensitive period (i.e., the summer season), it will also be protective of water quality during all other seasons. Additionally, the targeted reduction in the annual phosphorus load to lakes will result in the application of phosphorus controls that also address seasonal variation. For example, certain control practices such as stabilizing eroding drainage ways or maintaining septic systems will be in place throughout the year while others will be in effect during the times the sources are active (e.g., application of lawn fertilizer). In cases of rapidly flushing (less than 14 days) lakes or impoundments downstream of point sources it may be appropriate to set seasonal limits on phosphorus inputs based on the growing season (April-October). In such cases permit limits in the winter months could be relaxed (e.g. 1 mg/l total phosphorus), provided that permit limits on total suspended solids remain in effect.

Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes

Pollutant load reduction information:

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.

Table C1 presents the proposed management measures as well as the estimated pollutant load reductions and costs. The planning level cost estimates and pollutant load reduction estimates and estimates of BMP footprint were based off information obtained in the following sources and were also adjusted to 2016 values using the Consumer Price Index (CPI) (United States Bureau of Labor Statistics, 2016):

- Geosyntec Consultants, Inc. (2014);
- Geosyntec Consultants, Inc. (2015);
- King and Hagen (2011);
- Leisenring, et al. (2014);
- King and Hagen (2011);
- MassDEP (2016a);
- MassDEP (2016b);
- University of Massachusetts, Amherst (2004);
- Voorhees (2015);
- Voorhees (2016a);
- Voorhees (2016b);

Table C-1: Proposed Management Measures, Estimated Pollutant Load Reductions and Costs

Structural BMPs
No Structural BMP Data Found

Additional BMPs
No Additional BMP Data Found

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.

Table D-1 presents the funding needed to implement the management measures presented in this watershed plan. The table includes costs for structural and non-structural BMPs, operation and maintenance activities, information/education measures, and monitoring/evaluation activities.

Table D-1: Summary of Funding Needed to Implement the Watershed Plan.

Management Measures	Location	Capital Costs	Operation & Maintenance Costs	Relevant Authorities	Technical Assistance Needed	Funding Needed
Structural and Non-Structural BMPs (from Element C)						
Information/Education (see Element E)						
Monitoring and Evaluation (see Element H/I)						
					Total Funding Needed:	
Funding Sources:						

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.

Step 1: Goals and Objectives

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

Step 2: Target Audience

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

Step 3: Outreach Products and Distribution

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

Step 4: Evaluate Information/Education Program

Information and education efforts and how they will be evaluated.

Other Information

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.

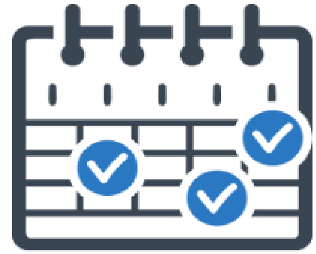

Table FG-1: Implementation Schedule and Interim Measurable Milestones

A. Structural & Non-Structural BMPs
No Data Found

B. Public Education & Outreach
No Data Found

C. Monitoring
No Data Found

Scheduling and milestone information:

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 target concentration(s) is presented under Element A of this plan. To achieve this target concentration, the annual 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 achieve 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 Gulf Pond.

Indirect Indicators of Load Reduction

Project-Specific Indicators

TMDL Criteria

Direct Measurements

Adaptive Management

References / Appendix

References

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Water Quality Assessment Reports

"*Millers River Watershed 2000 Water Quality Assessment Report*"

TMDL

"*Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes* "

Appendix A – Pollutant Load Export Rates (PLERs)

Land Use & Cover[1]	PLERs (lb/acre/year)		
	(TP)	(TSS)	(TN)
AGRICULTURE, HSG A	0.45	7.14	2.59
AGRICULTURE, HSG B	0.45	29.4	2.59
AGRICULTURE, HSG C	0.45	59.8	2.59
AGRICULTURE, HSG D	0.45	91.0	2.59
AGRICULTURE, IMPERVIOUS	1.52	650	11.3
COMMERCIAL, HSG A	0.03	7.14	0.27
COMMERCIAL, HSG B	0.12	29.4	1.16
COMMERCIAL, HSG C	0.21	59.8	2.41
COMMERCIAL, HSG D	0.37	91.0	3.66
COMMERCIAL, IMPERVIOUS	1.78	377	15.1
FOREST, HSG A	0.12	7.14	0.54
FOREST, HSG B	0.12	29.4	0.54
FOREST, HSG C	0.12	59.8	0.54
FOREST, HSG D	0.12	91.0	0.54
FOREST, HSG IMPERVIOUS	1.52	650	11.3
HIGH DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.27
HIGH DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.16
HIGH DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.41
HIGH DENSITY RESIDENTIAL, HSG D	0.37	91.0	3.66
HIGH DENSITY RESIDENTIAL, IMPERVIOUS	2.32	439	14.1
HIGHWAY, HSG A	0.03	7.14	0.27
HIGHWAY, HSG B	0.12	29.4	1.16
HIGHWAY, HSG C	0.21	59.8	2.41
HIGHWAY, HSG D	0.37	91.0	3.66
HIGHWAY, IMPERVIOUS	1.34	1,480	10.2
INDUSTRIAL, HSG A	0.03	7.14	0.27
INDUSTRIAL, HSG B	0.12	29.4	1.16

INDUSTRIAL, HSG C	0.21	59.8	2.41
INDUSTRIAL, HSG D	0.37	91.0	3.66
INDUSTRIAL, IMPERVIOUS	1.78	377	15.1
LOW DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.27
LOW DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.16
LOW DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.41
LOW DENSITY RESIDENTIAL, HSG D	0.37	91.0	3.66
LOW DENSITY RESIDENTIAL, IMPERVIOUS	1.52	439	14.1
MEDIUM DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.27
MEDIUM DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.16
MEDIUM DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.41
MEDIUM DENSITY RESIDENTIAL, HSG D	0.37	91.0	3.66
MEDIUM DENSITY RESIDENTIAL, IMPERVIOUS	1.96	439	14.1
OPEN LAND, HSG A	0.12	7.14	0.27
OPEN LAND, HSG B	0.12	29.4	1.16
OPEN LAND, HSG C	0.12	59.8	2.41
OPEN LAND, HSG D	0.12	91.0	3.66
OPEN LAND, IMPERVIOUS	1.52	650	11.3
[1]HSG = Hydrologic Soil Group			

Watershed-Based Plan – Lake Monomonac

MASSACHUSETTS
watershed·based plans

WATERSHED-BASED PLAN

Lake Mononomac

June 8, 2021

Prepared By:

Insert Organization Name
Insert Address
Insert Town, MA

Prepared For:

MassDEP
Commonwealth of Massachusetts
Department of Environmental Protection

Contents

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).

1. General Watershed Information

Table A-1: General Watershed Information

Watershed Name (Assessment Unit ID):	Lake Mononomac (MA35047)
Major Basin:	MILLERS
Watershed Area (within MA):	1334.2 (ac)
Water Body Size:	594 (ac)

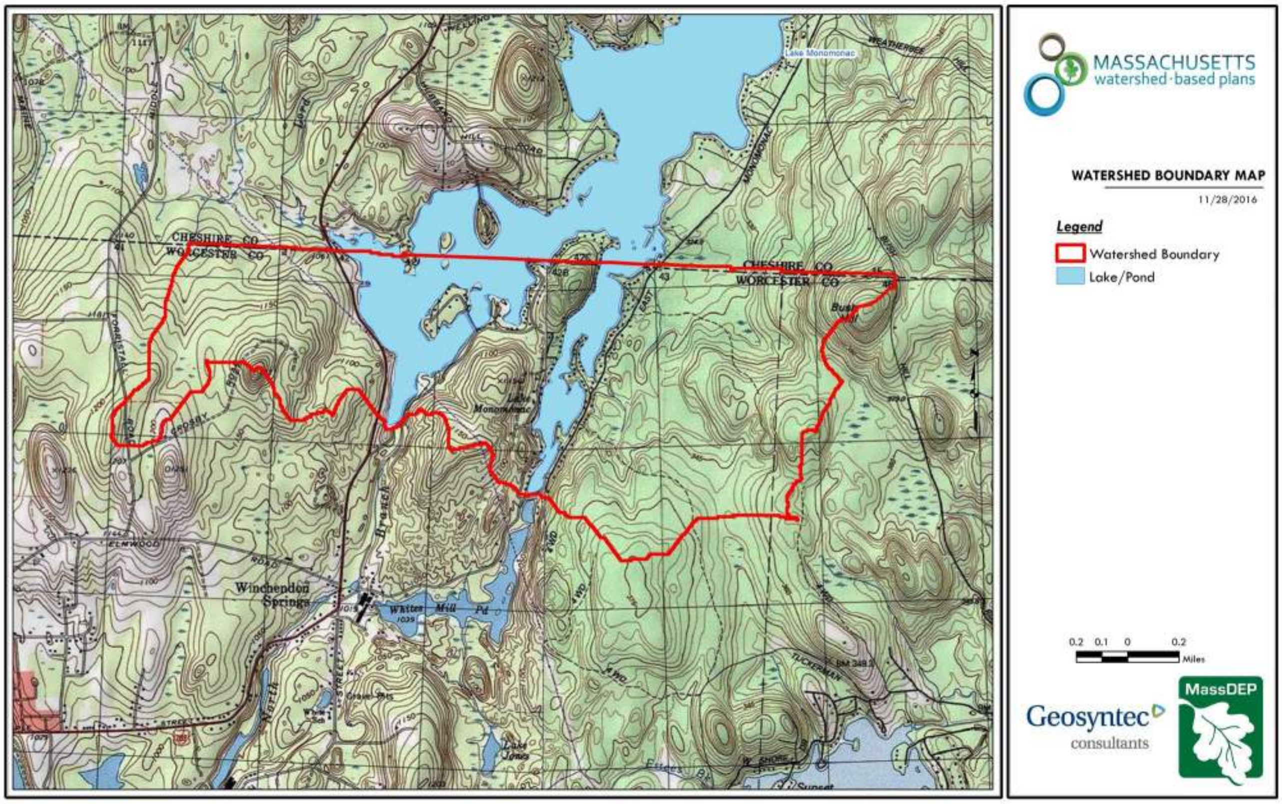

Figure A-1: Watershed Boundary Map (MassGIS, 1999; MassGIS, 2001; USGS, 2016)

Ctrl + Click on the map to view a full sized image in your web browser.

General watershed information:

2. MassDEP Water Quality Assessment Report and TMDL Review

The following reports are available:

No Associated Report Summaries Are Found

Literature review information:

3. Water Quality Impairments

Known water quality impairments, as documented in the Massachusetts Department of Environmental Protection (MassDEP) 2012 Massachusetts Integrated List of Waters, are listed below. Impairment categories from the Integrated List are as follows:

Table A-2: 2012 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.

Table A-3: Water Quality Impairments

Assessment Unit ID	Waterbody	Integrated List Category	Designated Use	Impairment Cause	Impairment Source
MA35047	**Lake Monomonac**	**5**	Fish Consumption	Mercury in Fish Tissue	Source Unknown
MA35047	**Lake Monomonac**	**5**	Fish, other Aquatic Life and Wildlife	Non-Native Aquatic Plants	Introduction of Non-native Organisms (Accidental or Intentional)

4. 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. Lake Mononomac is a Class 'B' waterbody. The water quality goal for fecal coliform bacteria is based on the Massachusetts Surface Water Quality Standards.

Table A-4: Surface Water Quality Classification by Assessment Unit ID

Assessment Unit ID	Waterbody	Class
MA35047	Lake Monomonac	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.).

Table A-5: Water Quality Goals

Pollutant	Goal	Source
Total Phosphorus (TP)	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	Massachusetts Surface Water Quality Standards (314 CMR 4.00, 2013)

	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.	

Note: *There may be more than one water quality goal for bacteria due to different Massachusetts Surface Water Quality Standards Classes for different Assessment Units within the watershed.*

5. Land Use Information

A. Watershed Land Uses

Table A-6: Watershed Land Uses

Land Use	Area (acres)	% of Watershed
Agriculture	7.11	0.5
Commercial	0	0
Forest	980.71	73.5
High Density Residential	0	0
Highway	0	0
Industrial	1.54	0.1
Low Density Residential	141.03	10.6
Medium Density Residential	0	0
Open Land	20.23	1.5
Water	183.59	13.8

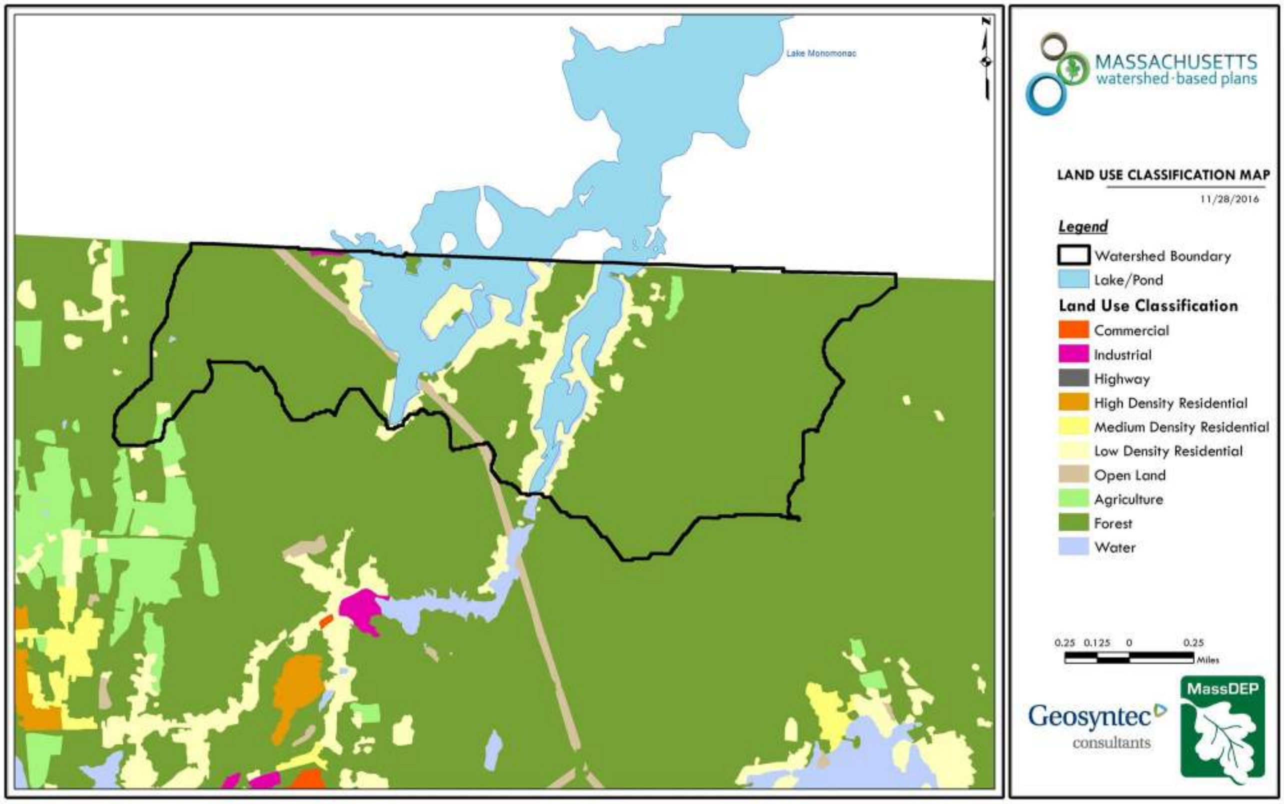

Figure A-2: Watershed Land Use Map (MassGIS, 2009b; MassGIS, 1999; MassGIS, 2001; USGS, 2016)
Ctrl + Click on the map to view a full sized image in your web browser.

B. 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 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 watershed 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.

Estimated TIA in the watershed: 3.6 %

Estimated DCIA in the watershed: 1.5 %

The relationship between TIA and water quality can generally be categorized as follows (Schueler et al. 2009):

Table A-7: 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.

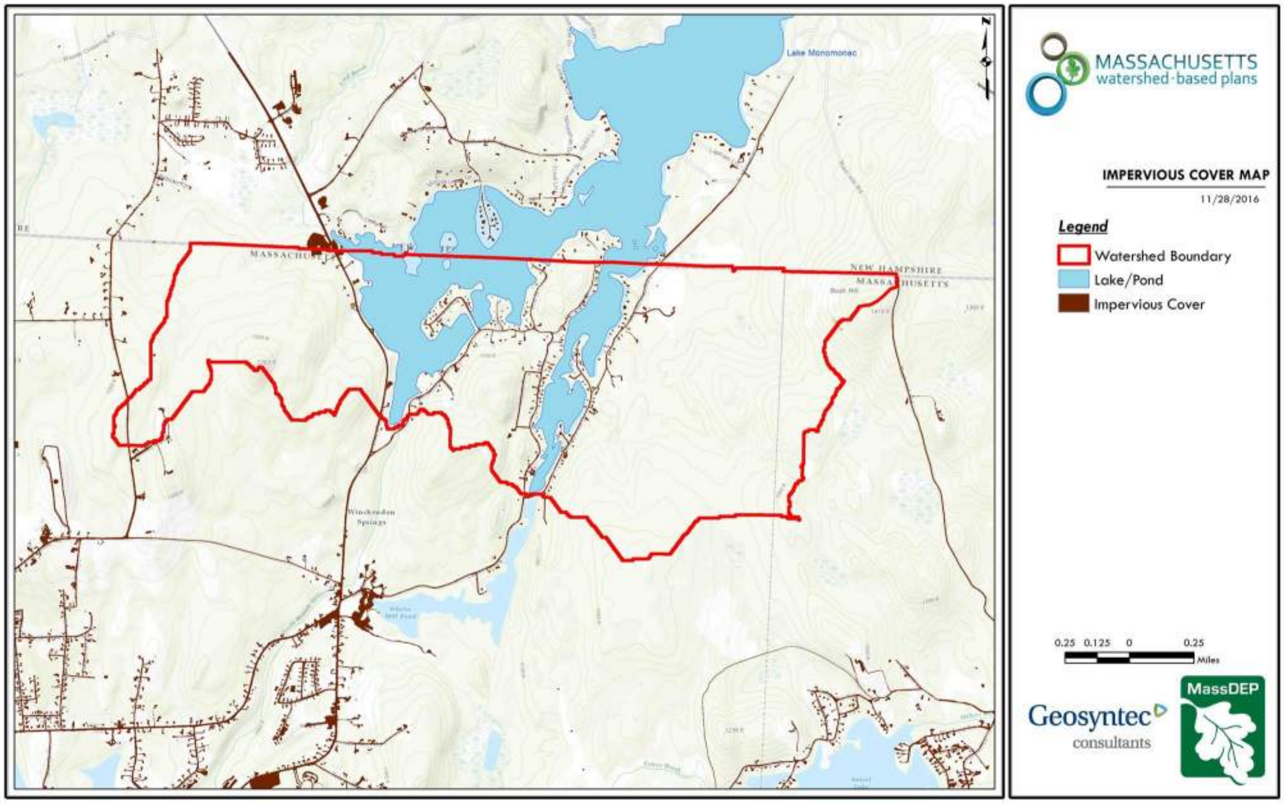

Figure A-3: Watershed Impervious Surface Map (MassGIS, 2009b; MassGIS, 1999; MassGIS, 2001; USGS, 2016)

Ctrl + Click on the map to view a full sized image in your web browser.

Land use information:

6. Pollutant Loading

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 watershed was estimated by multiplying each land use/cover type area by its pollutant load export rate (PLER). 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 (Voorhees, 2016b) (see documentation provided in Appendix A) 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)

Table A-8: Estimated Pollutant Loading for Key Nonpoint Source Pollutants

Land Use Type	Pollutant Loading[1]		
	Total Phosphorus (TP) (lbs/yr)	Total Nitrogen (TN) (lbs/yr)	Total Suspended Solids (TSS) (tons/yr)
Agriculture	3	21	0.29
Commercial	0	0	0.00
Forest	119	569	31.43
High Density Residential	0	0	0.00
Highway	0	0	0.00
Industrial	2	13	0.17
Low Density Residential	34	348	4.57
Medium Density Residential	0	0	0.00
Open Land	3	53	0.76
TOTAL	161	1,004	37.22

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

Pollutant loading information:

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.

1. Estimated Pollutant Loads

Table 1 lists estimated pollutant loads for the following primary nonpoint source (NPS) pollutants: total phosphorus (TP), total nitrogen (TN), total suspended solids (TSS). These estimated loads are based on the pollutant loading analysis presented in Section 4 of Element A.

2. Water Quality Goals

Water quality goals for primary NPS pollutants are listed in Table 1 based on the following:

- TMDL water quality goals (if a TMDL exists for the water body);
- For all water bodies, including impaired waters that have a pathogen 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.
- If the water body does not have a TMDL for TP, 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". Because there are no similar default water quality goals for TN and TSS, goals for these pollutants are provided in Table 1 only if a TMDL exists or alternate goal(s) have been optionally established by the WBP author.
- According to the USEPA Gold Book, total phosphorus should not exceed 50 ug/L in any stream at the point where it enters any lake or reservoir. The water quality loading goal was estimated by multiplying this target maximum phosphorus concentration (50 ug/L) by the estimated annual watershed discharge for the selected water body. To estimate the annual watershed discharge, the mean flow was used, which was estimated based on United States Geological Survey (USGS) "Runoff Depth" estimates for Massachusetts (Cohen and Randall, 1998). Cohen and Randall (1998) provide statewide estimates of annual Precipitation (P), Evapotranspiration (ET), and Runoff (R) depths for the northeastern U.S. According to their method, Runoff Depth (R) is defined as all water reaching a discharge point (including surface and groundwater), and is calculated by:

$$P - ET = R$$

A mean Runoff Depth R was determined for the watershed by calculating the average value of R within the watershed boundary. This method includes the following assumptions/limitations:

a. For lakes and ponds, the estimate of annual TP loading is averaged across the entire watershed. However, a given lake or reservoir may have multiple tributary streams, and each stream may drain land with vastly different characteristics. For example, one tributary may drain a highly developed residential area, while a second tributary may drain primarily forested and undeveloped land. In this case, one tributary may exhibit much higher phosphorus concentrations than the average of all streams in the selected watershed.

b. The estimated existing loading value only accounts for phosphorus due to stormwater runoff. Other sources of phosphorus may be relevant, particularly phosphorus from on-site wastewater treatment (septic systems) within close proximity to receiving waters. Phosphorus does not typically travel far within an aquifer, but in watersheds that are primarily unsewered, septic systems and other similar groundwater-related sources may contribute a significant load of phosphorus that is not captured in this analysis. As such, it is important to consider the estimated TP loading as "the expected TP loading from stormwater sources."

Table B-1: Pollutant Load Reductions Needed

Pollutant	Existing Estimated Total Load	Water Quality Goal	Required Load Reduction
Total Phosphorus	161 lbs/yr	375 lbs/yr	0 lbs/yr
Total Nitrogen	1004 lbs/yr		
Total Suspended Solids	37 ton/yr		
Bacteria	*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.	

TMDL Pollutant Load Criteria

No TMDL Pollutant Load Criteria Data Found

Pollutant load reduction information:

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.

Table C1 presents the proposed management measures as well as the estimated pollutant load reductions and costs. The planning level cost estimates and pollutant load reduction estimates and estimates of BMP footprint were based off information obtained in the following sources and were also adjusted to 2016 values using the Consumer Price Index (CPI) (United States Bureau of Labor Statistics, 2016):

- Geosyntec Consultants, Inc. (2014);
- Geosyntec Consultants, Inc. (2015);
- King and Hagen (2011);
- Leisenring, et al. (2014);
- King and Hagen (2011);
- MassDEP (2016a);
- MassDEP (2016b);
- University of Massachusetts, Amherst (2004);
- Voorhees (2015);
- Voorhees (2016a);
- Voorhees (2016b);

Table C-1: Proposed Management Measures, Estimated Pollutant Load Reductions and Costs

Structural BMPs
No Structural BMP Data Found

Additional BMPs
No Additional BMP Data Found

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.

Table D-1 presents the funding needed to implement the management measures presented in this watershed plan. The table includes costs for structural and non-structural BMPs, operation and maintenance activities, information/education measures, and monitoring/evaluation activities.

Table D-1: Summary of Funding Needed to Implement the Watershed Plan.

Management Measures	Location	Capital Costs	Operation & Maintenance Costs	Relevant Authorities	Technical Assistance Needed	Funding Needed
Structural and Non-Structural BMPs (from Element C)						
Information/Education (see Element E)						
Monitoring and Evaluation (see Element H/I)						
					Total Funding Needed:	
Funding Sources:						

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.

Step 1: Goals and Objectives

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

Step 2: Target Audience

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

Step 3: Outreach Products and Distribution

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

Step 4: Evaluate Information/Education Program

Information and education efforts and how they will be evaluated.

Other Information

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.

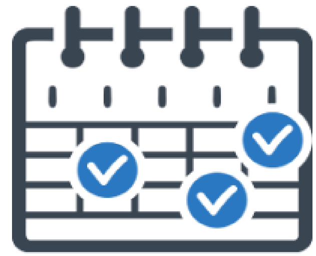

Table FG-1: Implementation Schedule and Interim Measurable Milestones

A. Structural & Non-Structural BMPs
No Data Found

B. Public Education & Outreach
No Data Found

C. Monitoring
No Data Found

Scheduling and milestone information:

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 target concentration(s) is presented under Element A of this plan. To achieve this target concentration, the annual 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 achieve 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 Gulf Pond.

Indirect Indicators of Load Reduction

Project-Specific Indicators

TMDL Criteria

Direct Measurements

Adaptive Management

References / Appendix

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Water Quality Assessment Reports

No Water Quality Assessment Reports Found

TMDL

No TMDL Found

Appendix A – Pollutant Load Export Rates (PLERs)

Land Use & Cover[1]	PLERs (lb/acre/year)		
	(TP)	(TSS)	(TN)
AGRICULTURE, HSG A	0.45	7.14	2.59
AGRICULTURE, HSG B	0.45	29.4	2.59
AGRICULTURE, HSG C	0.45	59.8	2.59
AGRICULTURE, HSG D	0.45	91.0	2.59
AGRICULTURE, IMPERVIOUS	1.52	650	11.3
COMMERCIAL, HSG A	0.03	7.14	0.27
COMMERCIAL, HSG B	0.12	29.4	1.16
COMMERCIAL, HSG C	0.21	59.8	2.41
COMMERCIAL, HSG D	0.37	91.0	3.66
COMMERCIAL, IMPERVIOUS	1.78	377	15.1
FOREST, HSG A	0.12	7.14	0.54
FOREST, HSG B	0.12	29.4	0.54
FOREST, HSG C	0.12	59.8	0.54
FOREST, HSG D	0.12	91.0	0.54
FOREST, HSG IMPERVIOUS	1.52	650	11.3
HIGH DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.27
HIGH DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.16
HIGH DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.41
HIGH DENSITY RESIDENTIAL, HSG D	0.37	91.0	3.66
HIGH DENSITY RESIDENTIAL, IMPERVIOUS	2.32	439	14.1
HIGHWAY, HSG A	0.03	7.14	0.27
HIGHWAY, HSG B	0.12	29.4	1.16
HIGHWAY, HSG C	0.21	59.8	2.41
HIGHWAY, HSG D	0.37	91.0	3.66
HIGHWAY, IMPERVIOUS	1.34	1,480	10.2
INDUSTRIAL, HSG A	0.03	7.14	0.27
INDUSTRIAL, HSG B	0.12	29.4	1.16

INDUSTRIAL, HSG C	0.21	59.8	2.41
INDUSTRIAL, HSG D	0.37	91.0	3.66
INDUSTRIAL, IMPERVIOUS	1.78	377	15.1
LOW DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.27
LOW DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.16
LOW DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.41
LOW DENSITY RESIDENTIAL, HSG D	0.37	91.0	3.66
LOW DENSITY RESIDENTIAL, IMPERVIOUS	1.52	439	14.1
MEDIUM DENSITY RESIDENTIAL, HSG A	0.03	7.14	0.27
MEDIUM DENSITY RESIDENTIAL, HSG B	0.12	29.4	1.16
MEDIUM DENSITY RESIDENTIAL, HSG C	0.21	59.8	2.41
MEDIUM DENSITY RESIDENTIAL, HSG D	0.37	91.0	3.66
MEDIUM DENSITY RESIDENTIAL, IMPERVIOUS	1.96	439	14.1
OPEN LAND, HSG A	0.12	7.14	0.27
OPEN LAND, HSG B	0.12	29.4	1.16
OPEN LAND, HSG C	0.12	59.8	2.41
OPEN LAND, HSG D	0.12	91.0	3.66
OPEN LAND, IMPERVIOUS	1.52	650	11.3

[1]HSG = Hydrologic Soil Group