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# STORMWATER MANAGEMENT PLAN

MS4 GENERAL PERMIT COMPLIANCE

JUNE 2020

TOWN OF  
**Wenham**  
MASSACHUSETTS



# swmp

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# STORMWATER MANAGEMENT PLAN

## ANNUAL REVISIONS

This document was first finalized in June 2019, in accordance with MS4 Permit requirements for Year 1. The document was updated in June 2020 to reflect accomplishments made during Permit Year 2. The SWMP now includes an updated list of outfalls and receiving waters, and comments on all public education and public engagement efforts that have been completed to date. An Operation and Maintenance (O&M) Plan for municipal operations and facilities has been developed and appended to the SWMP. Standard Operating Procedures for Site Plan Review, Site Inspection, and Enforcement have also been developed and appended to this document.

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# STORMWATER MANAGEMENT PLAN

## CERTIFICATION

**Authorized Representative:** All reports, including SWPPPs, inspection reports, annual reports, monitoring reports, reports on training and other information required by the MS4 Permit must be signed by a person described in Appendix B, Subsection 11.A of the 2016 MS4 Permit or by a duly authorized representative of that person in accordance with Appendix B, Subsection 11.B. of the 2016 MS4 Permit. If there is an authorized representative to sign MS4 reports, there must be a signed and dated written authorization. The authorization letter can be found in Appendix K.

"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 Bill Tyack

Signature Bill Tyack Date 9/30/2020

## 1.0 INTRODUCTION / OVERVIEW

### 1.1 Regulatory Summary and Purpose

The Federal Water Pollution Control Act (WPCA), initially enacted in 1948, established ambient water quality standards to specify acceptable levels of pollution in lieu of preventing the causes of water pollution. The 1972 amendments to the WPCA, referred to as the Clean Water Act (CWA), implemented measures which were focused on establishing effluent limitations on point sources, or “any discernable, confined, and discrete conveyance... from which pollutants are or may be discharged.”

The 1972 CWA introduced the National Pollutant Discharge Elimination System (NPDES). The NPDES program was established as the fundamental regulatory mechanism of the CWA, requiring direct dischargers of pollutants into waters of the United States to obtain a NPDES permit. Between 1972 and 1987, the NPDES permit program focused on improving surface water quality by reducing pollutants of industrial process wastewater and municipal sewage. During this period, several nationwide studies on water quality, most notably the United States Environmental Protection Agency (EPA) National Urban Runoff Plan (NURP), identified stormwater discharges as a significant source of water pollution.

The results of the NURP and similar studies, resulted in the reauthorization of the CWA in 1987 with the passage of the Water Quality Act (WQA). The WQA established a legal framework and required EPA to develop a comprehensive phased program for regulating municipal and industrial stormwater discharges under the NPDES permit program.

The NPDES Phase 1 Rule, which was issued in November 1990, addressed stormwater dischargers from medium to large municipal separate storm sewer systems (MS4s), which were communities serving a population of at least 100,000 people, as well as stormwater discharges from 11 categories of industrial activity.

The NPDES Phase 2 Rule, which was promulgated in December 1999, addressed small MS4s serving a population of less than 100,000 people in urbanized areas. The Phase 2 Rule requires nationwide coverage of all operators of small MS4s that are located within the boundaries of the Bureau of the Census-defined “urbanized area” (UA) based on the latest decennial census. The Phase 2 rule requires that all MS4s located within “urbanized areas” automatically comply with the Phase 2 stormwater regulations. Appendix B of this report provides a map of the Phase II stormwater “permit compliance area” for Watertown as determined by the USEPA using the latest decennial (year 2010) census. Since Watertown is located within an urbanized area, the EPA has designated the Town of Watertown as a Phase 2 Community, which must comply with the NPDES regulations. In the Commonwealth of Massachusetts, the EPA retains primacy as the Phase 2 permitting authority. On May 1, 2003, the EPA and the Massachusetts Department of Environmental Protection (MADEP) jointly issued the NPDES General Permit for Discharges from Small MS4s and in July 2003, Watertown submitted the required Notice of Intent (NOI) for inclusion under this General Permit.

The 2003 NPDES Phase 2 MS4 General Permit (2003 MS4 Permit) required the Town of Wenham to develop, implement, and enforce a Stormwater Management Program (SWMP). The objectives of the

SWMP were to reduce the discharge of pollutants from the MS4 to the maximum extent practicable, to protect water quality, and to satisfy the appropriate water quality requirements of the CWA.

This Stormwater Management Plan will specifically satisfy the requirements set forth by the NPDES Phase 2 regulations which expanded Phase 1's efforts to preserve, protect, and improve the nation's water resources from polluted stormwater runoff to include additional operators of "traditional" (i.e. cities and towns) and "non-traditional" (i.e. Federal and state agencies) MS4s. The 2003 MS4 Permit expired on May 1, 2008 but was administratively continued for covered permittees until a new MS4 Permit was issued on April 4<sup>th</sup>, 2016 and became effective on July 1, 2018. A copy of the 2016 MS4 Permit is included in Appendix C. On October 1, 2018, the town submitted a Notice of Intent to EPA to obtain coverage under the 2016 MS4 Permit. A copy of this Notice of Intent is included in Appendix D. EPA posted the town's Notice of Intent for public comment on March 1, 2019 for a 30-day period. The town received authorization from EPA to discharge under the 2016 MS4 Permit on April 5, 2019.

Since the Town of Wenham was previously covered under the 2003 Small MS4 General Permit, the town currently has many practices and programs in place related to stormwater management and pollution prevention. This plan coordinates and incorporates these programs, policies, guidelines and practices into one document and expands their reach to encompass the requirements and goals of the 2016 MS4 Permit. The objectives of the MS4 Permit are accomplished through the implementation of Best Management Practices (BMPs) for each of the following six minimum control measures.

- Public education and outreach
- Public involvement / participation
- Illicit discharge detection and elimination
- Construction site stormwater runoff control
- Post-construction stormwater management in new development or redevelopment
- Pollution prevention/good housekeeping

The town's efforts to comply with these BMPs, as outlined in their Notice of Intent, are included in Section 2.0.

## 1.2 Town Governance and Structure

The Town of Wenham has a Board of Selectman – Town Administrator form of government. The legislative body of Wenham is an Open Town Meeting comprised of all registered voters.

Various entities within the town have the responsibility for implementation of the MS4 Permit requirements as outlined in this plan and include the following:

- Department of Public Works
- Board of Health
- Conservation Commission
- Planning/Zoning Boards

Specific representatives from each of these departments or committees that are responsible for implementation of the SWMP are outlined in the table below:

Name	Title	Affiliation
Bill Tyack	Director of Public Works	Town Employee
Missy Berry	Conservation Agent	Town Employee
Margaret Hoffman	Planning/Zoning Coordinator	Town Employee

### 1.3 Town Demographic Information

Wenham is in Essex County and has a total area of 8.1 square miles (21.1 square kilometers). It is bordered by Danvers to the south west, Beverly and Manchester by the Sea to the southeast, Hamilton to the north, and Topsfield to the northwest. As of 2016, the population was 5,078.

Territory comprised of urban developed areas that meet the minimum population requirements set forth by the EPA, according to the 2000 and 2010 census data, shall be referred to as urbanized area. Rural land uses and sparsely populated tracts shall be categorized as non-regulated for the purposes of the MS4 permit. Wenham is mostly comprised of urbanized area (UA) as shown in the regulated area map in Appendix B and only 5.91% of the town is water.

Principal highways located within the boundaries of Wenham include Route 22, Route 97, Yankee Division Highway/Route 128, and Route 1A, known locally as Main Street. There are approximately 2.94 miles of state-maintained roadways within town.

Climate within the Town of Wenham ranges from January average minimum temperature of 25.8 degrees Fahrenheit (°F) to July average maximum temperature of 82.0°F. The average annual precipitation is 43.6 inches, distributed throughout the year. The rainiest month is November, with approximately 4.50 inches of rain.

### 1.4 Water Resources

The entire town is located within the boundaries of the Ipswich watershed. Each water body is identified by the name and segment ID number. The primary waterbodies are the Wenham Lake (MA92073), Miles River (MA92-03) tributary to Longham Reservoir (MA92030), Pleasant Pond (MA92049), and Valley Road Swamp. Miles River extends the entire North to South of the Town and discharges to the Longham Reservoir. These water bodies are impaired for several reasons according to the Final 2016 303(d) list of Impaired Waters. All impairments and outfalls discharging to these water bodies are summarized in Table 1.2 below:

Table 1.2  
RECEIVING WATERS AND IMPAIRMENTS

Waterbody	Impairment	Number of Outfalls Discharging to Receiving Water
Wenham Lake (MA92073)	DDT, Mercury in Fish Tissue	0
Pleasant Pond (MA92049)	Mercury in Fish Tissue	2
Longham Reservoir (MA92030)	None	5
Miles River (MA92-03)	Benthic Macroinvertebrates, Dissolved Oxygen	3

**1.5 Endangered Species and Historic Properties Determination**

The 2016 MS4 Permit requires that Wenham demonstrate that all activities regulated under this permit will not adversely affect endangered and threatened species or critical habitat, or impact federal historic properties on the National Register of Historic Properties (NRHP). The town must demonstrate that there is no critical habitat for any endangered species within its boundaries, and if such a habitat exists, that no best management practice shall interfere with that habitat. Wenham must also certify that no discharge will affect a property that is listed or eligible for listing on the NRHP, that any such effects have written acknowledgements from the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (THPO), or other representative that such effects shall be mitigated, and written proof that any best management practices constructed under this permit will include measures to minimize harmful effects on these properties.

Through consultation with the US Fish & Wildlife Service (USFWS), it was determined that the only threatened species within Wenham is the northern long-eared bat. Correspondence with USFWS is appended to the town’s Notice of Intent included in Appendix D. Actions currently included in this SWMP will not affect this species. Therefore, the town has determined that it can certify eligibility under USFWS Criterion C for coverage under the permit. Prior to construction of any structural BMPs, the town will consult with USFWS to confirm that the proposed project will not impact the northern long-eared bat or any other endangered or threatened species that may be identified in the future.

Wenham can certify eligibility under Criterion A on their Notice of Intent for coverage under the permit because the town was previously covered under the 2003 MS4 Permit, and conditions have not changed since that determination. The town does have multiple federal historic properties, each property is identified by a name and it’s National Register Information System number these properties include: Wenham Historic District (73000852) and several historic buildings; Claflin-Richards House (73000853), Friend James, House (90000268), Kimball, Solomon, House (90000264), Larch Farm (90000266), Newman, Fiske, Dodge House (90000267), Old Farm (9000265), Perkins, John, House (90000269). These historic properties are located at a minimum of 500 feet away from any impaired water body. It has been determined to be very unlikely that any disturbance would impact these properties. Prior to construction of any structural BMPs, the town will consult with the State Historic

Preservation Officer by submitting a completed Project Notification Form to confirm that the proposed project will not impact any federal historic properties.

### 1.6 Increased Discharges

Any increased discharges (including increased pollutant loadings) through the MS4 to waters of the United States are subject to Massachusetts antidegradation regulations at 314 CMR 4.04. Section 2.1.2 of the 2016 MS4 Permit requires the Town of Wenham to comply with the provisions of 314 CMR 4.04 including information submittal requirements and obtaining authorization for increased discharges where appropriate. Any authorization by MassDEP for an increased discharge is required to be incorporated into this SWMP.

The Town understands that there shall be no increased discharges, including increased pollutant loadings from the MS4 to impaired waters listed in categories 5 or 4b on the most recent Massachusetts Integrated Report of Waters listed pursuant to Clean Water Act section 303(d) and 305(b) unless the Town demonstrates that there is no net increase in loading from the MS4 to the impaired water of the pollutant(s) for which the waterbody is impaired. If necessary, the Town of Wenham will demonstrate compliance with this provision by either:

- Documenting that the pollutant(s) for which the waterbody is impaired is not present in the MS4's discharge and retaining documentation of this finding with the SWMP; or
- Documenting that the total load of the pollutant(s) of concern from the MS4 to any impaired portion of the receiving water will not increase as a result of the activity and retain documentation of this finding in the SWMP. Unless otherwise determined by the Permittee, USEPA or by MADEP that additional demonstration is necessary, compliance with the requirements of Part 2.2.2 and Part 2.3.6 of this permit, including all reporting and documentation requirements, shall be considered as demonstrating no net increase as required by this part.

### 1.7 Surface Water Drinking Supplies

Section 3.0 of the MS4 Permit requires permittees to prioritize discharges to public drinking water supply sources in implementation of the SWMP. Longham Reservoir is a drinking water supply source for the Towns of Salem and Beverly. The Town of Wenham has three regulated outfalls that discharge to wetland around Longham Reservoir. The Town will consider this area a priority in implementation of their SWMP. The Town will examine the feasibility of providing pretreatment and implementing spill control measures if stormwater discharges from these outfalls are found to have an impact on receiving water quality in Longham Reservoir based on further field reconnaissance. The Town will also continue to avoid directed discharges to Longham Reservoir.

## 2.0 MINIMUM CONTROL MEASURES

### 2.1 Introduction

This section of the report provides a summary of the regulatory requirements for each of the six minimum control measures as defined under the MS4 General Permit by the EPA. It also provides a summary of those stormwater management practices that the town currently employs. As part of the requirements of the Notice of Intent submitted to EPA on October 1, 2018, as included in Appendix D, the town has established a list of the Best Management Practices (BMPs) that it plans to implement in order to comply with each of the six minimum control measures. Most of these BMPs will be implemented over the next five years (i.e. the permit term). However, the town will have up to 20 years to implement some of the permit requirements as indicated. The town's progress with respect to implementation of the BMPs, and other stormwater related activities, are summarized in annual reports submitted to EPA in accordance with the MS4 Permit. Under the 2003 MS4 Permit, the Town made significant progress in compliance with the requirements of the 2016 MS4 Permit. The Town of Wenham submitted 14 annual reports to EPA, in compliance with the 2003 MS4 Permit, between 2004 and 2018. Links to these reports are included in Appendix E.

The BMPs selected for each minimum control measure are summarized and briefly described in this section. Specific details for each BMP including measurable goals, implementation dates and individuals responsible for implementation are stated in each of the respective sections for each control measure in this plan. The Director of Public Works and the Conservation/ Planning Agents will be responsible for implementation and/or future enforcement of each of the BMPs for the six minimum control measures.

Compliance with requirements of the permit related to water quality limited waters and approved TMDLs is included in Section 6.

### 2.2 Permit Requirements and Implementation Timeframes

#### 2.2.1 Public Education and Outreach

The public education and outreach minimum control measure requires the town to make educational information available to the public and other stakeholders specified by the permit. Wenham has been participating in public education and outreach activities since the 2003 MS4 Permit was enacted.

#### **Regulatory Requirement:**

Section 2.3.2 of the 2016 MS4 General Permit requires permittees to "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 pollutants in stormwater are reduced."

#### **Existing Town Practices:**

Since the 2003 MS4 Permit became effective, the Town of Wenham has implemented several public education initiatives. The Department of Public Works has distributed fliers at Spring Town Meeting and

maintained the Town's Website listing notices/information regarding stormwater pollution prevention and the stormwater hotline. The Town of Wenham will continue to implement these practices.

In addition to all the work being performed by the town at present, this new iteration of the permit requires additional public education measures. Wenham must distribute two targeted messages within five years to the following audiences, spaced at least one year apart for each audience:

1. Residents
2. Businesses, Institutions and Commercial Facilities
3. Developers (Construction)
4. Industrial Facilities

In order to accomplish this, the town has partnered with the Greenscapes North Shore Coalition and will implement the following BMPs:

**BMP: Brochures/Pamphlets**

**Description:** Brochure will consist of 'how-to-guide' for residents on how rain gardens work and how to install them at their home.

**Targeted Audiences:** Residents.

**Responsible Department/Parties:** Greenscapes North Shore Coalition

**Measurable Goals:** Tracking the number of brochures/pamphlets and any provided resident testimonials.

**Message Dates:** This brochure was not distributed during year 2 reporting period due to COVID-19 restrictions. Greenscapes North Shore Coalition plans to print and distribute sometime in the fall.

**BMP: Workshop/ Info Sheet**

**Description:** Workshop and associated literature will cover LID options for reducing runoff and promoting on-site infiltration. Pricing, maintenance and ordinances will also be discussed.

**Targeted Audiences:** Developers (construction)

**Responsible Department/Parties:** Greenscapes North Shore Coalition and Planning

**Measurable Goals:** Tracking the number of attendees at the workshop and any increase in LID use.

**Message Dates:** This workshop was not completed during the year 2 reporting period due to COVID-19 restrictions.

**BMP: Brochures/Pamphlets**

**Description:** Brochure will include general info on LIDs that can assist in stormwater management and pollution prevention. Content will be targeted to "environmental contacts" at industrial facilities, or property managers where applicable.

**Targeted Audiences:** Industrial Facilities

**Responsible Department/Parties:** Greenscapes North Shore Coalition

**Measurable Goals:** Track the number of brochures/pamphlets distributed and any follow up phone call(s).

**Message Dates:** Completed during Permit Year 2 (FY2020) and materials to be maintained throughout the permit term.

**BMP: Workshop**

**Description:** Waterworks presentation will discuss specific BMPs for parking lots; how to reduce impervious surfaces and maintain the space more sustainably.

**Targeted Audiences:** Business, Institutions and Commercial Facilities

**Responsible Department/Parties:** Greenscapes North Shore Coalition and Planning

**Measurable Goals:** Track number of attendees and number of presentations redistributed to commercial representatives.

**Message Dates:** To be completed during Permit Year 3 (FY2021).

**BMP: Workshop**

**Description:** Workshop and literature will go into greater detail, following the workshop regarding low impact development held in year one. Town bylaws and associated incentives will be outlined.

**Targeted Audiences:** Developers (construction)

**Responsible Department/Parties:** Greenscapes North Shore Coalition and Planning

**Measurable Goals:** Track number of attendees.

**Message Dates:** To be completed during Permit Year 3 (FY2021)

**BMP: Meeting/Presentation**

**Description:** Presentation will discuss proper “greenscaping” practices on a business/commercial level. Content will be targeted to property managers and will include salt/sand storage and landscape management.

**Targeted Audiences:** Business, Institutions and Commercial Facilities

**Responsible Department/Parties:** Greenscapes North Shore Coalition

**Measurable Goals:** Track the number of attendees.

**Message Dates:** To be completed during Permit Year 4 (FY2022).

**BMP: Meeting/Presentation**

**Description:** Presentation will discuss proper “greenscaping” practices on an Industrial level. Content will be targeted to property managers and will include salt/sand storage and landscape management.

**Targeted Audiences:** Industrial Facilities

**Responsible Department/Parties:** Greenscapes North Shore Coalition and planning

**Measurable Goals:** Tracking number of attendees

**Message Dates:** To be completed during Permit Year 4 (FY2022).

**BMP: Meeting/Presentation**

**Description:** Greenscapes NS will conduct a “Greenscapes 101” presentation for residents. Presentation will discuss the importance of clean and plentiful water.

**Targeted Audiences:** Residents

**Responsible Department/Parties:** Greenscapes North Shore Coalition and planning

**Measurable Goals:** Track number of attendees

**Message Dates:** To be completed during Permit Year 5 (FY2023).

Greenscapes North Shore Coalition – Supplemental Deliverables

**BMP Name: Greenscapes Guide**

**Message Description and Distribution Method:** Comprehensive 24 page magazine, describing sustainable landscaping practices, DIY residential stormwater management projects, native plant suggestions and more!

**Audience:** Residents

**Responsible Parties:** Greenscapes North Shore Coalition & Municipal Staff

**Measurable Goal:** 500 delivered to municipal staff October 2019, available online at [www.greenscapes.org/greenscapes-guide/](http://www.greenscapes.org/greenscapes-guide/)

**Delivery Date(s):** Oct-19

**BMP Name:** Greenscapes "Water Smart" Post

**Message Description and Distribution Method:** Social media post with sustainable lawn watering tips and some common misconceptions about outdoor water usage.

**Audience:** Residents

**Responsible Parties:** Greenscapes North Shore Coalition & Municipal Staff

**Measurable Goal:** Shared with 75 municipal staff July 2019. Posted on GNSC Facebook May 2020.

**Delivery Date(s):** July 2019, May 2020

**BMP Name:** Greenscapes "Fall Calendar" Post

**Message Description and Distribution Method:** Social media post including an illustrated yard waste calendar and check list.

**Audience:** Residents

**Responsible Parties:** Greenscapes North Shore Coalition & Municipal Staff

**Measurable Goal:** Shared with 75 municipal staff Sept 2019. Posted on GNSC Facebook May 2020

**Delivery Date(s):** Sept 2019, May 2020

**BMP Name:** Greenscapes "Keep Drains Clear" Post

**Message Description and Distribution Method:** Social media post describing the importance of keeping storm drains clear of yard debris and trash.

**Audience:** Residents **Responsible Parties:** Greenscapes North Shore Coalition & Municipal Staff

**Measurable Goal:** Shared with 75 municipal staff October 2019. Posted on GNSC Facebook May 2020

**Delivery Date(s):** Oct 2019, May 2020

**BMP Name:** "Global Water Access" Post

**Message Description and Distribution Method:** Social media post containing an infographic with facts and figures about global access to clean water and common water pollutants.

**Audience:** Residents

**Responsible Parties:** Greenscapes North Shore Coalition & Municipal Staff

**Measurable Goal:** Shared with 75 municipal staff January 2019. Posted on GNSC Facebook May 2020

**Delivery Date(s):** Jan 2020, May 2020

**BMP Name:** EPA "Do Your Part, Be Septic Smart" Post

**Message Description and Distribution Method:** Social media post containing information and tips for proper septic system maintenance.

**Audience:** Residents

**Responsible Parties:** Greenscapes North Shore Coalition & Municipal Staff

**Measurable Goal:** Shared with 75 municipal staff February 2019. Posted on GNSC Facebook May 2020

**Delivery Date(s):** Feb 2020, May 2020

**BMP Name:** Greenscapes "Unflushables" Post

**Message Description and Distribution Method:** Social media post containing information on "what not to flush" and how to avoid common wastewater system issues.

**Audience:** Residents

**Responsible Parties:** Greenscapes North Shore Coalition & Municipal Staff

**Measurable Goal:** Shared with 75 municipal staff April 2020. Posted on GNSC Facebook May 2020.  
**Delivery Date(s):** April 2020, May 2020

**BMP Name:** Greenscapes 101 Webinar & Videos

**Message Description and Distribution Method:** Greenscapes staff delivered a virtual presentation on residential stormwater management, the importance of natural solutions in combatting stormwater/water resource management, and made suggestions for at-home projects that interested residents could explore. Projects included using native grass species, converting a lawn into a water-friendly garden, and more. The webinar was recorded, and posted on the Greenscapes website.

**Audience:** Residents

**Responsible Parties:** Greenscapes North Shore Coalition

**Measurable Goal:** 35 "attended" webinar. Recordings shared with 75 municipal staff June 6, 2020 and posted on Greenscapes website at [www.greescapes.org/resources-videos/](http://www.greescapes.org/resources-videos/)

**Delivery Date(s):** Webinar held 4-29-20. Recordings posted and shared June 2020.

**BMP Name:** Keeping Water Clean - School Program

**Message Description and Distribution Method:** Program engages 5th grade students in several activities designed to raise their stormwater and water conservation awareness. Students learn about what a watershed is, what stormwater, groundwater and wastewater are, how they can negatively or positively impact these water systems, along with more details about each system and how it should be protected/maintained.

**Audience:** Residents

**Responsible Parties:** Greenscapes North Shore Coalition

**Measurable Goal:** 1341 Students, 98 Teachers, 131 Parents reached throughout the north shore region (before school closures).

**Delivery Date(s):** September 2019 - March 2020

**BMP Name:** ThinkBlueMA "Fowl Water" Video

**Message Description and Distribution Method:** Think Blue Massachusetts "Fowl Water" video defines stormwater and explains the impact that pollution like trash, oil, cigarettes and dog poop can have on stormwater and our waterways. Video available at <https://www.thinkbluemassachusetts.org/> , [www.greescapes.org/resources-videos/](http://www.greescapes.org/resources-videos/) and spread as an advertisement on Facebook, Instagram, & YouTube

**Audience:** Residents

**Responsible Parties:** ThinkBlueMA, Greenscapes North Shore Coalition

**Measurable Goal:** Total of 1,228,467 impressions recorded in the combined 24 Greenscapes communities (665,620 views on Facebook & Instagram, 562,847 views on Youtube)

**Delivery Date(s):** May 16th 2020 - June 5th 2020

**BMP Name:** Miscellaneous Greenscapes Social Media

**Message Description and Distribution Method:** Additional messaging was shared with municipal staff in year 1 of the permit period. Content includes pet waste management, fertilizing recommendations, road salt alternatives, and more. All posts are also available at [www.greescapes.org/resources-socialmedia/](http://www.greescapes.org/resources-socialmedia/) and on the GNSC Facebook page.

**Audience:** Residents

**Responsible Parties:** Greenscapes North Shore Coalition & Municipal Staff

**Measurable Goal:** Varied

**Delivery Date(s):** July 2019 - June 2020

**BMP Name:** Kitchen Counter Experiment Video Series

**Message Description and Distribution Method:** Episodes 1 & 2 of the "Kitchen Counter Experiment Series" were created in the spring of 2020, in an attempt to replace missed school programming, caused by the Covid-19 pandemic. The videos are exploratory experiments that cover material such as "what not to flush" and the benefits of natural/chemical free fertilizers.

**Audience:** Residents

**Responsible Parties:** Greenscapes North Shore Coalition

**Measurable Goal:** 210 views on Vimeo

**Delivery Date(s):** Apr-20

**BMP Name:** Miscellaneous Greenscapes Tabling Events

**Message Description and Distribution Method:** Hamilton Garden Expo, Salem Sound Liquid Lecture Series, MVPC Monthly Meetings. Did not attend farmers markets, as in years past, due to covid-related restrictions.

**Audience:** Residents

**Responsible Parties:** Greenscapes North Shore Coalition

**Measurable Goal:** Varied

**Delivery Date(s):** July 2019 - March 2020

### *2.2.2 Public Involvement / Participation*

#### **Regulatory Requirement:**

Section 2.3.3 of the 2016 MS4 Permit requires the permittee to "provide opportunities to engage the public to participate in the review and implementation of the permittee's SWMP." Public participation benefits the program by increasing public support, including additional expertise and involving community groups/organizations.

#### **Existing Town Practices:**

The Town of Wenham has been proactive in providing opportunities for public participation and involvement in stormwater management practices. The Town assists in the spring Pleasant Pond Cleanup Day where volunteers, perform a cleanup of the Pleasant Pond area. The Town has also provided assistance in the past when separate clean up events were scheduled by Gordon College, the local boy scouts, and the local Audubon Society. They will continue to assist these organizations when they schedule clean ups. In addition, the Town holds an annual household hazardous waste disposal day to allow residents an opportunity to properly dispose of hazardous materials.

#### **BMP: SWMP Review**

**Description:** The DPW will make the SWMP available to the public when requested and provide for public comment annually.

**Responsible Department/Parties:** DPW Operations

**Measurable Goals:** Allow for public review of the SWMP annually. Post the SWMP and Annual Reports on the Town's website and/or make them available at Town Hall.

**Message Dates:** Completed during Permit Years 1 (FY2019) and 2 (FY2020), and to be continued for the duration of the permit.

**BMP: Public Participation**

**Description:** Household hazardous waste collection

**Targeted Audiences:** Residents.

**Responsible Department/Parties:** DPW Operations

**Measurable Goals:** Continue to hold an annual household hazardous waste drop off day for residents. Track number of residents that participate and amount and types of materials collected.

**Message Dates:** Completed during Permit Years 1 (FY2019) and 2 (FY2020), and to be continued for the duration of the permit.

**BMP: Public Participation**

**Description:** Community Clean-up

**Responsible Department/Parties:** DPW Operations

**Measurable Goals:** Continue to provide support to community clean-up activities held by Gordon College, the local boy scouts and Audubon groups when they schedule events. Track number of participations, material collected, and support provided.

**Message Dates:** Implemented during permit year 1 (FY2019) and to be continued for the duration of the permit. Due to COVID-19 restrictions community clean-ups for permit year 2 (FY2020) were limited.

**BMP: Public Participation**

**Description:** Maintain stormwater hotline

**Responsible Department/Parties:** DPW Operations

**Measurable Goals:** Continue to inform residents of the proper town offices to contact if they need information or to report problems dealing with stormwater issues. Maintain logs with information on the calls received and the actions/responses performed.

**Message Dates:** Completed during Permit Year 1 (FY2019), and to be continued for the duration of the permit.

**BMP: Public Participation**

**Description:** Community Clean-up

**Responsible Department/Parties:** Department of Public Works Operations

**Measurable Goals:** Continue to assist in the annual community clean-up at Pleasant Pond. Track number of participants, and the amount of debris collected.

**Message Dates:** Completed during Permit Year 1 (FY2019) and continued for the duration of the permit. In permit year 2 (FY2020), the community clean-up took place in April 2020 but was limited due to COVID-19 restrictions.

*2.2.3 Illicit Discharge Detection and Elimination*

**Regulatory Requirement:**

Section 2.3.4 of the 2016 MS4 General Permit requires the permittee to develop a written Illicit Discharge Detection and Elimination (IDDE) program. The IDDE program is designed to “systematically find and eliminate sources of non-stormwater discharges to its municipal separate storm sewer system and implement procedures to prevent such discharges.”

**Existing Town Practices:**

The Town of Wenham has implemented Illicit Discharge Detection and Elimination initiatives. A Stormwater Infrastructure GIS map was created and is accessible from the Town's Website. Catch basins and outfalls are inspected during annual cleaning for signs of illicit connections.

These permit requirements can be achieved through implementation of the following BMPs:

**BMP: SSO Inventory**

**Description:** The Town does not have any municipally owned or maintained sanitary sewers in Town so this BMP is not applicable.

**Responsible Department/Parties:** N/A

**Measurable Goals:** N/A

**Message Dates:** N/A

**BMP: Update GIS Drainage Map**

**Description:** Update drainage map in accordance with permit conditions and update annually during IDDE program implementation.

**Responsible Department/Parties:** Department of Public Works Operations

**Measurable Goals:** Update map within 2 years of effective date of permit and complete full system map 10 years after effective date of permit. Report on progress annually.

**Message Dates:** Completed initial mapping updates within 2 years of the permit effective date and complete full system map within 10 years of permit effective date (FY2020, FY2029).

**BMP: Written IDDE Program**

**Description:** Create written IDDE program to meet permit conditions.

**Responsible Department/Parties:** Department of Public Works Operations

**Measurable Goals:** Complete within 1 year of the effective date of permit and update as required.

**Message Dates:** Completed during Permit Year 1 (FY2019).

**BMP: Implement IDDE Program**

**Description:** Implement catchment investigations according to program and permit conditions

**Responsible Department/Parties:** Department of Public Works Operations

**Measurable Goals:** Begin within two years of permit effective date, and complete 10 years after effective date of permit. Track annually the number of illicit connections that are identified and removed.

**Message Dates:** Completed during Permit Year 2 (FY2020) and to be continued for the duration of the permit.

**BMP: Employee Training**

**Description:** Train employees on IDDE program components and implementation.

**Responsible Department/Parties:** Department of Public Works Operations

**Measurable Goals:** Provide training to municipal employees annually. Track the number of employees that receive training.

**Message Dates:** Completed during permit year 1 (FY2019) and to continue training annually.

**BMP: Conduct Dry Weather Screening and Sampling**

**Description:** Conduct in accordance with outfall screening procedure and permit conditions

**Responsible Department/Parties:** Department of Public Works Operations

**Measurable Goals:** Complete within 3 years of permit effective date. Track number of outfalls that are screened and sampled annually.

**Message Dates:** Began in permit year 2 and to be completed within 3 years of the permit effective date (FY2021).

**BMP: Conduct Wet Weather Screening**

**Description:** Conduct Wet Weather Screening and sampling at outfalls/ interconnections in catchments where System Vulnerability Factors are present in accordance with permit conditions

**Responsible Department/Parties:** Department of Public Works Operations

**Measurable Goals:** Complete within 10 years of permit effective date. Track number of outfalls that are screened and sampled annually.

**Message Dates:** Begin during Permit Year 4 (FY2022) and complete within 10 years of the permit effective date (FY2029).

**BMP: Ongoing Screening**

**Description:** Conduct Dry and Wet weather screening (as necessary).

**Responsible Department/Parties:** Department of Public Works Operations

**Measurable Goals:** Complete ongoing outfall screening upon completion of IDDE program implementation.

**Message Dates:** To be performed once initial screening of outfalls and IDDE investigations are complete (FY2029).

**BMP: Catchment Prioritization and Ranking**

**Description:** Assess and rank the potential for all catchments to have illicit discharges. Identify catchments with System Vulnerability Factors that will necessitate wet weather sampling.

**Responsible Department/Parties:** Department of Public Works Operations

**Measurable Goals:** The town has assessed within existing catchments the potential for illicit discharges by obtaining and evaluating data regarding the following:

- Sensitivity or critical nature of the receiving water or environment
- Severity of the illicit connection indicator parameters
- Potential for direct or indirect public exposure
- Areas with chronic problems and inadequate level of service
- Areas proposed for infrastructure capital improvements

Since the town has already ranked and prioritized their catchments for investigation, most notably based on available outfall sampling data, the town has a strong understanding of problem catchment areas. To complete an additional ranking exercise seems redundant and priority for ongoing investigations should be assigned to outfalls as determined by the criteria above.

**Message Dates:** Completed in permit year 1 (FY2019).

**BMP: Follow-up Ranking**

**Description:** Update catchment prioritization and ranking as additional dry weather screening information becomes available.

**Responsible Department/Parties:** Department of Public Works Operations

**Measurable Goals:** The outfall ranking described above shall be amended by the town as new sampling results become available after the first round of dry-weather screening and sampling.

**Message Dates:** To be completed within three years of the permit effective date (FY2021).

**BMP: Catchment Investigation Procedures**

**Description:** Develop written catchment investigation procedures and incorporate into the IDDE Plan.

**Responsible Department/Parties:** Department of Public Works Operations

**Measurable Goals:** Amend written IDDE Plan as needed with catchment investigation procedures.

**Message Dates:** Completed 18 months after the effective date of the permit (FY2019).

*2.2.4 Construction Site Stormwater Runoff Control*

**Regulatory Requirement:**

Section 2.3.5 of the 2016 MS4 Permit requires the permittee to create a program 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 US through the permittee’s MS4.” The permittee will conduct site plan reviews, site inspections and include procedures for public involvement.

**Existing Town Practices:**

Wenham has existing subdivision Rules and Regulations that establishes requirements for an Erosion Control Program. These regulations require erosion control measures to be shown on plans to be reviewed by the Town (Planning Boards) and implemented during construction. These rules and regulations give the Planning Board Authority to enforce these erosion control measures.

The town is currently in the process of updating their Planning Board rules and regulations to better clarify the requirements for Construction Site Stormwater runoff control (ETA spring/summer 2019).

To attain compliance in the 2016 MS4 permit, the town will implement the following BMPs to supplement the Towns rules and regulations.

**BMP: Site Inspection and enforcement of Erosion and Sediment Control (ESC) measures**

**Description:** Develop written procedures for site inspections and enforcement.

**Responsible Department/Parties:** DPW Operations/Planning Dept.

**Measurable Goals:** Complete within 1 year of the effective date of permit. Report on the number of site inspections and enforcement actions annually.

**Message Dates:** Completed during 1 year of the effective date of the permit (FY2019).

**BMP: Site Plan Review**

**Description:** Develop written procedures for site plan review that meet permit requirements and begin implementation.

**Responsible Department/Parties:** DPW Operations

**Measurable Goals:** Complete within 1 year of the effective date of permit. Report on the number of site plan reviews conducted, and enforcement actions taken annually.

**Message Dates:** Completed during 1 year of the effective date of the permit (FY2019).

**BMP: Erosion and Sediment Control**

**Description:** Continue to require construction operators to implement a sediment and erosion control program and enhance program as needed to meet permit requirements. Review and update existing regulations as needed to ensure that construction operators implement a sediment and erosion control program that includes BMPs that are appropriate for conditions at the construction site in accordance with permit requirements.

**Responsible Department/Parties:** Department of Public Works Operations

**Measurable Goals:** Complete within 1 year of the effective date of permit.

**Message Dates:** Updated within 1 year and enforced every year after the permit effective date (FY2019).

**BMP: Waste Control**

**Description:** Update existing regulations to include requirements for construction site operations to control wastes, including but not limited to, discarded building materials, concrete truck washout, chemicals, litter, and sanitary washes.

**Responsible Department/Parties:** Department of Public Works Operations/Planning Dept.

**Measurable Goals:** Update requirements to include control of wastes as needed within one year of the permit effective date.

**Message Dates:** Completed during the first year after the effective permit date (FY2019).

*2.2.5 Post-Construction Stormwater Management***Regulatory Requirement:**

Section 2.3.6 of the 2016 MS4 Permit requires the permittee to require developers to “reduce the discharge of pollutants found in stormwater through the retention or treatment of stormwater after construction on new or redeveloped sites.”

In this case, a site is defined as the “area extent of construction activities which includes but is not limited to the creation of new impervious cover and improvement of existing impervious cover.”

New Development is defined as construction activity that results in a total earth disturbance area equal to or greater than one acre on land that did not have any impervious area before work began.

Redevelopment is defined as any construction activity that disturbs greater than or equal to one acre and does not meet the requirements to be designated as new development.

**Existing Town Practices and Amendments:**

In order to comply with the requirements of the 2016 MS4 Permit, the town shall implement the following BMPs:

**BMP: As-Built plans for on-site stormwater control**

**Description:** Update existing procedures to require submission of as-built drawings within 2 years of completion of construction and ensure long term operation and maintenance.

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

**Measurable Goals:** Require submission of as-built plans and long-term O&M for completed projects. Complete within 2 years of permit effective date.

**Message Dates:** Complete within 3 years of the permit effective date (FY2021).

**BMP: Target Properties to Reduce Impervious Areas**

**Description:** Identify at least 5 permittee-owned properties that could be modified or retrofitted with BMPs to reduce frequency, volume, and pollutant loads associated with stormwater discharges and update annually.

**Responsible Department/Parties:** Department of Public Works Operations

**Measurable Goals:** Complete 4 years after effective date of permit and report annually on retrofitted properties.

**Message Dates:** Complete within 4 years of the permit effective date, and report annually regarding the number of retrofits identified thereafter, to maintain at least 5 retrofits always for the duration of the permit (FY2022).

**BMP: Allow for Green Infrastructure**

**Description:** 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 Public Works Operations/Planning

**Measurable Goals:** Complete assessment and implement recommendations of the report.

**Message Dates:** Complete within 4 years of the permit effective date (FY2022).

**BMP: Street Design and Parking Lot Guidelines**

**Description:** 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.

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

**Measurable Goals:** Complete assessment and implement recommendations of the report where feasible.

**Message Dates:** Complete within 4 years of the permit effective date (FY2022).

**BMP: Ensure the Requirements of the MA Stormwater Handbook are met**

**Description:** Review, and update existing regulations as needed, to meet retention and treatment requirements of the permit, and require compliance with the Stormwater Management Standards.

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

**Measurable Goals:** Complete within 3 years of permit effective date.

**Message Dates:** Complete within 3 years of the permit effective date (FY2021).

*2.2.6 Pollution Prevention / Good Housekeeping*

**Regulatory Requirement:**

Section 2.3.7 of the 2016 MS4 Permit requires the permittee to “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.”

This minimum control measure includes a training component and has the ultimate goal of preventing or reducing stormwater pollution from municipal activities and facilities such as parks

and open spaces, buildings and facilities, vehicles and equipment, and providing for the long-term operation and maintenance of MS4 infrastructure.

### **Existing Town Practices:**

Wenham has an currently employed good housekeeping measures adopted during the 2003 MS4 Permit. At least once a year, the DPW hires a subcontractor to inspect and clean 100% of the Town owned catch basins, and all streets are swept at least once a year. They have resolved to train public works employees as needed on good housekeeping techniques on all outfall locations, proper inspection techniques of outfall and CBs, and proper actions needed for chemical spills into the storm drain system.

To achieve compliance with the 2016 MS4 Permit, catch basins must be no more than 50% full at any given time. To achieve this, all structures must be cleaned, measured, logged and monitored to prevent excessive sediment accumulation. These measures are summarized in the following BMP practices:

### **BMP: O&M Procedures**

**Description:** Create written operation and maintenance (O&M) procedures addressing proper storage of materials, lawn maintenance and landscaping activities, protective practices, use and storage of petroleum products, employee training, waste management procedures for buildings and facilities, location of fueling areas, evaluation of possible leaks, and storage locations of town-owned vehicles and equipment.

**Responsible Department/Parties:** DPW Operations

**Measurable Goals:** Create and implement standard operation and maintenance procedures for all municipal activities and facilities. The town will be as specific with standard operating procedures as possible and ensure the continued implementation of all maintenance activities.

**Message Dates:** Completed within 2 years of the permit effective date (FY2020).

### **BMP: Inventory all Permittee-Owned Property**

**Description:** Inventory all permittee-owned parks and open spaces, buildings and facilities, and vehicles and equipment and update annually.

**Responsible Department/Parties:** DPW Operations

**Measurable Goals:** Create inventory and update annually.

**Message Dates:** Completed within 2 years of the permit effective date (FY2020).

### **BMP: Infrastructure O&M**

**Description:** Establish and implement a program for repair and rehabilitation of MS4 infrastructure.

**Responsible Department/Parties:** DPW Operations

**Measurable Goals:** Create and implement an operation and maintenance plan for stormwater infrastructure.

**Message Dates:** Completed within 2 years of the permit effective date (FY2020).

### **BMP: Stormwater Pollution Prevention Plan (SWPPP)**

**Description:** Create SWPPPs for DPW garage, and other waste-handling facilities as needed.

**Responsible Department/Parties:** DPW Operations

**Measurable Goals:** Complete and implement within 2 years of permit effective date and provide inspections quarterly and training annually thereafter. Track number of employees trained annually.

**Message Dates:** Complete and implement within 2 years of the permit effective date (FY2020). The training could not be conducted during Permit Year 2 due to the outbreak of COVID-19, but the Town hopes to complete the required training by September 30th, 2020.

**BMP: Catch Basin Cleaning**

**Description:** Establish schedule for catch basin cleaning such that each catch basin is no more than 50% full and clean catch basins on the schedules.

**Responsible Department/Parties:** DPW Operations

**Measurable Goals:** Clean catch basins on established schedule and report number of catch basins cleaned and volume of material removed annually. The town shall optimize the cleaning effort such that all catch basins have been located, measured, cleaned and monitored to ensure that each basin does not become more than 50% full of sediment and debris.

**Message Dates:** Completed catch basin optimization plan in year 2 of the permit (FY2020) and to be continued for the duration of the permit.

**BMP: Street Sweeping Program**

**Description:** Continue to sweep all streets and permittee-owned parking lots annually in accordance with permit conditions.

**Responsible Department/Parties:** DPW Operations

**Measurable Goals:** Sweep all streets and permittee-owned parking lots annually measure miles of roadway swept.

**Message Dates:** Completed and implement in permit year 1 (FY2019) and to be continued for the duration of the permit.

**BMP: Road salt use optimization program**

**Description:** Continue to update the town's existing program to minimize the use of road salt and sand, including the implementation of a computerized control system for salting equipment to improve salt distribution and application efficiency.

**Responsible Department/Parties:** DPW

**Measurable Goals:** Implement salt use optimization during deicing season. Track reduction in salt usage based on salt use optimization.

**Message Dates:** Completed and implement within 1 year after the permit effective date (FY2019).

**BMP: Inspections and Maintenance of Stormwater Treatment Structures**

**Description:** Establish and implement inspection and maintenance procedures and frequencies.

**Responsible Department/Parties:** DPW Operations

**Measurable Goals:** Inspect and maintain treatment structures at least annually. Track number of structures maintained and inspected annually.

**Message Dates:** Completed and implement in year 1 of the permit (FY2019) and to be continued for the duration of the permit.

**BMP: Catch Basin Cleaning Optimization**

**Description:** Develop and implement a plan to optimize inspection, cleaning, and maintenance of catch basins to ensure that permit conditions are met.

**Responsible Department/Parties:** DPW Operations

**Measurable Goals:** Complete within two years of permit effective date

**Message Dates:** Completed and implemented within 2 years of the permit effective date (FY2020).

### 3.0 REGULATORY STANDARDS

#### 3.1 Introduction

In order to prevent pollutants from entering the drainage system and being discharged to the environment with stormwater, Watertown has implemented a wide variety of Best Management Practices (BMPs) categorized under the six minimum control measures as discussed earlier in this document. The control measure for Post-Construction Stormwater Management is focused on improving stormwater pollution prevention into the future by ensuring that all new construction includes appropriate requirements for BMPs. To ensure post-construction stormwater management, the town previously developed and adopted the following under the 2003 MS4 Permit.

- Regulatory mechanisms establishing legal authority, prohibitions and requirements
- Design and construction standards governing stormwater infrastructure
- Requirements for long-term Operation and Maintenance (O&M) of structural BMPs.

Additional information regarding the town's current regulatory mechanisms adopted under the 2003 MS4 Permit, as well as the status of the town's compliance with the 2016 MS4 Permit regulatory requirements are included in this section.

#### 3.2 Existing Stormwater Regulatory Mechanisms

Under the 2003 MS4 Permit, the town developed a new bylaw, as well as updated rules and regulations, to comply with the permit, and to improve stormwater management town-wide.

##### 3.2.1 *Prohibition of Illicit Discharges to the Storm Drain System*

Wenham adopted an bylaw entitled, Stormwater Management Bylaw on May 3<sup>rd</sup>, 2008. A copy of this bylaw is included in Appendix F.

The bylaw is granted authority by the Home Rule Amendment of the Massachusetts Constitution, Home Rule statues, and the Clean Water Act, 40 CFR 122.34. This bylaw prohibits non-stormwater discharges to the drainage system. It also provides a specific list of non-stormwater discharges that are permissible under federal regulations, and by reference, local bylaw. The Department of Public Works is responsible for enforcement and has the authority to investigate suspected illicit discharges. The town has the authority to suspend or terminate the right to discharge to the MS4 of any discharger, including discharges associated with active construction sites. The bylaw mandates that all spills must be reported to the DPW and the Board of Health, and penalties and fines may be levied.

##### 3.2.2 *Stormwater Management and Erosion Control Ordinance*

The 2003 MS4 Permit required the town to develop, implement and enforce a program to address stormwater runoff from construction activities that disturb greater than one acre and discharge into the MS4. That program was also to include projects that disturb less than one acre if the project is part of a larger common plan of development which disturbs greater than one acre. As part of that

program, the town was to develop an ordinance or other regulatory mechanism to address construction runoff.

The Town currently has Planning Board rules and regulations that establish erosion control measures for projects under their jurisdiction. The Town is currently in the process of updating regulations to better clarify/ establish stormwater management and erosion control measures to comply with the MS4 permit. A copy of the Rules and Regulations is included in Appendix F. These proposed Rules and Regulations provide the regulatory authority to ensure compliance with the provisions outlined through permitting, inspection, maintenance and enforcement. The Rules and Regulations require that a Stormwater Management Permit is obtained for: In the case of the management of stormwater runoff from construction activities that discharge to the municipal separate storm sewer system and result in a land disturbance of equal to or greater than one acre, or less than one acre if part of a larger common plan of development that disturb one or more acres of land, applicants must submit the following: (1) a plan to control wastes generated by the construction activity on the construction site, (2) an Erosion and Sedimentation Control Plan, and (3) a plan to construct Stormwater Management Measures.

### 3.3 Review of Regulatory Mechanisms for Compliance with the 2016 MS4 Permit

A comprehensive review was conducted to evaluate whether the town's existing regulatory mechanisms for construction and post-construction stormwater management comply with the 2016 MS4 Permit requirements, and identify what modifications, if any, are needed to bring the town into compliance.

#### 3.3.1 Construction Site Stormwater Runoff Control

The 2016 MS4 Permit builds on the requirements of the 2003 MS4 Permit for construction site runoff control and requires the following (Year 1 requirements):

##### Site Inspection & Enforcement

*Permit Requirement: Development of written procedures for site inspections and enforcement of sediment and erosion control measures. These procedures shall clearly define who is responsible for site inspections as well as who has authority to implement enforcement procedures. The program shall provide that the permittee may, to the extent authorized by law, impose sanctions to ensure compliance with the local program. These procedures and regulatory authorities shall be documented in the SWMP.*

Excerpts from Draft Wenham's Regulations that Support Permit Requirement: The Town of Wenham is in the process of updating their Rules and Regulations to address all permit requirements.

##### Draft of Wenham's Planning Board, Rules and Regulations, Article IV., Section 6., D

##### *D. Site Inspection and Supervision*

1. *Pre-construction Meeting. Prior to starting clearing, excavation, construction, or land disturbing activity the applicant, the applicant's technical representative, the general*

contractor or any other person with authority to make changes to the project, shall meet with the Board or its designated agent, to review the permitted plans and their implementation.

2. *Board Inspection.* The Board or its designated agent shall make inspections as hereinafter required and shall either approve that portion of the work completed or shall notify the permittee wherein the work fails to comply with the Stormwater Permit as approved. The Permit and associated plans for grading, stripping, excavating, and filling work, bearing the signature of approval of the Board, shall be maintained at the site during the progress of the work. In order to obtain inspections, the permittee shall notify the Board at least two (2) working days before each of the following events:
  - a. Erosion and sediment control measures are in place and stabilized;
  - b. Site Clearing has been substantially completed;
  - c. Rough Grading has been substantially completed;
  - d. Final Grading has been substantially completed;
  - e. Close of the Construction Season; and
  - f. Final Landscaping (permanent stabilization) and project final completion.
  
3. *Permittee Inspections.* The permittee or his/her agent shall conduct and document inspections of all control measures) no less than weekly or as specified in the permit, and prior to and following anticipated storm events. The purpose of such inspections will be to determine the overall effectiveness of the control plan, and the need for maintenance or additional control measures. The permittee or his/her agent shall submit monthly reports to the Board or designated agent in a format approved by the Board.

All inspections shall be performed in accordance with the written standard operating procedures employed by the Town of Wenham.

### Sediment and Erosion Control BMPs

*Permit Requirement:* Requirements for construction site operators performing land disturbance activities within the MS4 jurisdiction that result in stormwater discharges to the MS4 to implement a sediment and erosion control program that includes BMPs appropriate for the conditions at the construction site. The program may include references to BMP design standards in state manuals, such as the Massachusetts Stormwater Handbook or design standards developed by the MS4. EPA supports and encourages the use of design standards in local programs. Examples of appropriate sediment and erosion control measures for construction sites include local requirements to:

- Minimize the amount of disturbed area and protect natural resources
- Stabilize sites when projects are complete, or operations have temporarily ceased
- Protect slopes on the construction site
- Protect all storm drain inlets and armor all newly constructed outlets
- Use perimeter controls at the site
- Stabilize construction site entrances and exists to prevent off-site tracking
- Inspect stormwater controls at consistent intervals

Excerpts from Draft Wenham's Regulations that Support Permit Requirement: The Town of Wenham is in the process of updating their Rules and Regulations to address all permit requirements.

Draft of Wenham's Planning Board, Rules and Regulations, Article IV., Section 6., B*B. Erosion and Sedimentation Control Plan*

*An applicant must describe its plan for properly stabilizing the site before construction begins and the BMPs that it will use during construction to minimize erosion of the soil and sedimentation of stormwater. These BMPs should include stabilization practices such as seeding, mulching, preserving trees and vegetative buffer strips, contouring, earth dikes, silt fences, drainage swales, sediment traps, check dams, and subsurface or pipe slope drains. BMPs utilized shall be appropriate for the conditions at the construction site in accordance with the Massachusetts Stormwater Handbook. The requirements of the Erosion and Sedimentation Control Plan are to:*

- 1. Minimize total area of disturbance;*
- 2. Sequence activities to minimize simultaneous areas of disturbance;*
- 3. Minimize peak rate of runoff in accordance with the Massachusetts Stormwater Handbook Volume 2;*
- 4. Minimize soil erosion and control sedimentation during construction, provided that prevention of erosion is preferred over sedimentation control;*
- 5. Divert uncontaminated water around disturbed areas;*
- 6. Maximize groundwater recharge;*
- 7. Install and maintain all erosion and sediment control measures in accordance with the manufacturer's specifications and good engineering practices;*
- 8. Prevent off-site transport of sediment;*
- 9. Protect and manage on and off-site material storage areas (overburden and stockpiles of dirt, borrow areas, or other areas used solely by the permitted project are considered a part of the project);*
- 10. Comply with applicable federal, state and local laws and regulations including waste disposal, sanitary sewer or septic system regulations, and air quality requirements, including dust control;*
- 11. Prevent significant alteration of habitats mapped by the Massachusetts Natural Heritage & Endangered Species Program as endangered, threatened or of special concern, estimated habitats of rare wildlife and certified vernal pools, and priority habitats of rare species from the proposed activities;*
- 12. Institute interim and permanent stabilization measures, which shall be instituted on a disturbed area as soon as practicable but no more than 14 days after construction activity has temporarily or permanently ceased on that portion of the site; and*
- 13. Prevent off-site vehicle tracking of sediments.*

Control of Wastes

*Permit Requirement: Requirements for construction site operators within the MS4 jurisdiction to control wastes, including but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes. These wastes may not be discharged to the MS4.*

Excerpts from Draft Wenham's Regulations that Support Permit Requirement: The Town of Wenham is in the process of updating their Rules and Regulations to address all permit requirements.

Draft of Wenham's Planning Board, Rules and Regulations, Article IV., Section 6., A*A. Plan to Control Wastes*

*An applicant must develop a plan to control wastes that lists the construction and waste materials expected to be generated or stored on the construction site. These wastes include, but are not limited to: discarded building materials, concrete truck washout, chemicals, litter, sanitary waste and material stockpiles. An applicant must also describe in narrative form the Best Management Practices that it will utilize to reduce pollutants from these materials including storage practices to minimize exposure of the materials to stormwater.*

Site Plan Review Inspection and Enforcement

*Permit Requirement: Development of written procedures for site plan review, inspection and enforcement. The site plan review procedure shall include a pre-construction review by the permittee of the site design, the planned operations at the construction site, planned BMPs during the construction phase, and the planned BMPs to be used to manage runoff created after development. The review procedure shall incorporate procedures for the consideration of potential water quality impacts, and procedures for the receipt and consideration of information submitted by the public. The site plan review procedure shall also include evaluation of opportunities for use of low impact design and green infrastructure. When the opportunity exists, the permittee shall encourage project proponents to incorporate these practices into the site design. The procedures for site inspection conducted by the permittee shall include the requirement that inspections occur during construction of BMPs as well as after construction of BMPs to ensure they are working as described in the approved plans, clearly defined procedures for inspections including qualifications necessary to perform the inspections, the use of mandated inspections forms if appropriate, and procedure for tracking the number of site reviews, inspections, and enforcement actions.*

Recommended Modification: The town may want to consider development of a separate site plan review checklist for use by the permittee, if one does not already exist.

*3.3.2 Post-Construction Stormwater Management*

The 2016 MS4 Permit builds on the requirements of the 2003 MS4 Permit for post construction runoff from new development and redevelopment and requires the following (Year 2 requirements):

Low Impact Development

*Permit Requirement: Low Impact Development (LID) site planning and design strategies must be used to the maximum extent feasible.*

Recommended Modification: The Stormwater Management Plan shall contain an evaluation of any Low Impact Development Techniques considered for the proposed development.

BMP Design Guidance

*Permit Requirement: The design of treatment and infiltration practices should follow the guidance in Volume 2 of the Massachusetts Stormwater Handbook, as amended, or other federally or State approved BMP design guidance.*

Recommended Modification: Section 6.0 of the town's Rules and Regulations for Stormwater Management and Erosion Control indicate that "BMPs utilized shall be appropriate for the conditions at the construction site in accordance with the Massachusetts Stormwater Handbook." The town should consider amending this statement to indicate that "all stormwater management systems shall be designed in accordance with the Massachusetts Stormwater Management Standards and Volume 2 of the Massachusetts Stormwater Handbook."

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Compliance with the Stormwater Management Standards for New Development

Permit Requirement: *Stormwater Management systems on new development sites shall be designed to:*

- *Not allow new stormwater conveyances to discharge untreated stormwater in accordance with Massachusetts Stormwater Handbook Standard 1;*
- *Control peak runoff rates in accordance with Massachusetts Stormwater Handbook Standard 2;*
- *Recharge groundwater in accordance with Massachusetts Stormwater Handbook Standard 3;*
- *Eliminate or reduce the discharge of pollutants from land uses with higher pollutant loads as defined in the Massachusetts Stormwater Handbook in accordance with Massachusetts Stormwater Handbook Standard 5;*
- *Protect Zone 2 or Interim Wellhead Protection Areas of public water supplies in accordance with Massachusetts Stormwater Handbook Standard 6;*
- *Implement long term maintenance practices in accordance with Massachusetts Stormwater Handbook Standard 9;*
- *Require that all stormwater management systems be designed to:*
  1. *Retain the volume of runoff equivalent to, or greater than, one (1) inch multiplied by the total post-construction impervious surface area on the site;*

AND/OR

2. *Remove 90% of the average annual load of TSS generated from the total post-construction impervious surface area on the site AND 60 % of the average annual load of TP generated from the post-construction impervious surface area on the site. Pollutant removal shall be calculated consistent with EPA Region 1's Evaluation tool provided by EPA Region 1, where available. If EPA Region 1 tools do not address the planned or installed BMP performance any federally or State approved BMP design guidance or performance standards may be used to calculated BMP performance.*

Recommended Modification: Review the Town's Rules and Regulations to ensure they meet or exceed the requirements of the Massachusetts Stormwater Handbook Standards.

Compliance with the Stormwater Management Standards for Redevelopment

Permit Requirement: *Stormwater management systems on redevelopment sites shall meet the following standards to the maximum extent feasible:*

- *Not allow new stormwater conveyances to discharge untreated stormwater in accordance with Massachusetts Stormwater Handbook Standard 1;*
- *Control peak runoff rates in accordance with Massachusetts Stormwater Handbook Standard 2;*
- *Recharge groundwater in accordance with Massachusetts Stormwater Handbook Standard 3;*
- *The pretreatment and structural best management practices requirements of Standards 5 (eliminate or reduce the discharge of pollutants from land uses with higher pollutant loads as defined in the Massachusetts Stormwater Handbook) and 6 (protect Zone 2 or Interim Wellhead Protection Areas of public water supplies in accordance with Massachusetts Stormwater Handbook Standard 6);*
- *Stormwater management systems on redevelopment sites shall also improve existing conditions by requiring that stormwater management systems be designed to:*
  1. *Retain the volume of runoff equivalent to, or greater than 0.8 inch multiplied by the total post-construction impervious surface area on the site;*

*AND/OR*

2. *Remove 80% of the average annual post-construction load of TSS generated from the total post-construction impervious area on the site AND 50% of the average annual load of TP generated from the total post-construction impervious surface area on the site. Pollutant removal shall be calculated consistent with EPA Region 1's Evaluation tool provided by EPA Region 1, where available. If EPA Region 1 tools do not address the planned or installed BMP performance any federally or State approved BMP design guidance or performance standards may be used to calculated BMP performance.*
- *Stormwater management systems on redevelopment sites may utilize offsite mitigation within the same USGS HUC10 as the redevelopment site to meet the equivalent retention or pollutant removal requirements indicated above.*

Recommended Modification: Review the Town's Rules and Regulations to ensure they meet or exceed the requirements of the Massachusetts Stormwater Handbook Standards.

#### Submission of As-Builts

Permit Requirement: *The permittee shall require, at a minimum, the submission of as-built drawings no later than two (2) years after completion of construction projects. The as-built drawings must depict all on site controls, both structural and non-structural, designed to manage the stormwater associated with the completed site (post construction stormwater management).*

Recommended Modification: The town may want to consider development of a minimum requirement submission checklist for as-built drawings.

#### Long-term Operation & Maintenance

Permit Requirement: *The new development/redevelopment program shall have procedures to ensure adequate long-term operation and maintenance of stormwater management practices that are put in*

*place after the completion of a construction project. These procedures may include the use of dedicated funds or escrow accounts for development projects or the acceptance of ownership by the permittee of all privately owned BMPs. These procedures may also include the development of maintenance contracts between the owner of the BMP and the permittee. Alternatively, these procedures may include the submission of an annual certification documenting the work that has been done over the last 12 months to properly operate and maintain the stormwater control measures. The procedures to require submission of as-built drawings and ensure long term operation and maintenances shall be a part of the SWMP.*

Recommended Modification: The town may want to consider development of an annual certification documenting long-term O&M procedures that were put in place after the completion of a construction project.

## 4.0 IDDE MONITORING AND PROGRESS

### 4.1 IDDE Plan

The Illicit Discharge Detection and Elimination (IDDE) Plan has been developed by the Town of Wenham to address the requirements of the 2016 National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) set forth by the United States Environmental Protection Agency (USEPA). The permit effective date was July 1, 2018.

Under the MS4 permit, Wenham is required to employ best management practices for the six minimum control measures in an effort to reduce the discharge of pollutants from the MS4 to the maximum extent practicable. The measures are as follows:

1. Public Education and Outreach
2. Public Involvement and Participation
3. Illicit Discharge Detection and Elimination
4. Construction Site Stormwater Runoff Control
5. Stormwater Management in New Development and Redevelopment (Post Construction Stormwater Management); and
6. Good Housekeeping and Pollution Prevention for Permittee Owned Operations.

As part of Minimum Control Measure No. 3, Illicit Discharge Detection and Elimination (IDDE), the Town is required to implement an IDDE program to systematically find and eliminate sources of non-stormwater discharges to its MS4 and implement procedures to prevent such discharges. This includes, but is not limited to, the following measures:

1. Developing a comprehensive map of the Town's drainage system that builds upon the outfalls and receiving waters that were previously mapped under the 2003 MS4 Permit.
2. Ensuring that appropriate regulatory mechanisms and enforcement procedures, as required under the 2003 MS4 Permit, are in place to prohibit illicit discharges.
3. Developing and implementing a written plan to detect and eliminate illicit discharges, which references the Town's authority to implement all aspects of the IDDE program, clearly identifies responsibilities with regard to eliminating illicit discharges, and outlines written procedures for dry and wet weather outfall screening and sampling and catchment investigations.
4. Providing training annually to employees involved in the IDDE program about the program, including how to recognize illicit discharges and SSOs.

Wenham has developed a comprehensive written IDDE Plan, under separate cover, to meet the requirements of the 2016 MS4 Permit.

Such measures will be performed with the goal of finding and removing illicit discharges, which include fixed point source discharges such as illegal/improper sanitary or floor drain connections, in addition to all isolated or recurring discharges such as illegal dumping and improper disposal of waste. Illicit Discharges could also be indirect sources that infiltrate into the drainage system through cracks/defects in infrastructure, such as sanitary wastes from septic systems. Exceptions do exist in

the regulation for the discharge of clean water from sources such as water line flushing, fire-fighting operations, non-contact cooling waters, and for other discharges that have separately obtained a permit from the NPDES Program.

#### 4.1.1 Mapping

The Town has already developed a comprehensive map of their drainage system, which includes outfalls, pipes, manholes, and catch basins. Outfalls have been analyzed to create a defined catchment area that includes surface runoff to catch basins tributary to the identified outfall. The catchment delineation process considered each catch basin upstream from the and the area that would conceivably drain to that catch basin based on topography and impervious cover. As drainage infrastructure mapping becomes more complete over the course of the investigations performed throughout the permit term, this exercise will be refined and updated.

The Town has approximately:

- 11 miles of gravity pipe/culverts ranging
- 581 catch basins;
- 113 storm drain manholes;
- 241 municipal outfalls; both non-regulated and regulated outfalls

Mapping has been in accordance with the 2016 MS4 Permit's accuracy guidelines and has been recorded on a publicly available town map, the most recent version of which can be found attached to the NOI included in Appendix D of this report.

Wenham has reviewed drainage infrastructure within town boundaries to determine ownership. Private infrastructure or infrastructure owned and operated by another municipality or a state entity has been determined and designated in the Town's drainage GIS.

The mapping will serve as a planning tool for the implementation and phasing of the Town's IDDE Program and demonstration of the extent of complete and planned investigations and corrections. The Town will update their mapping as needed to reflect newly discovered information and required corrections or modifications. The Town will report annually on progress toward completion of the system map in their MS4 Annual Report.

#### 4.1.2 Catchment Prioritization and Ranking

The Town completed an initial inventory and priority ranking to assess the illicit discharge potential of each regulated catchment and the related public health significance. The ranking will determine the priority order for screening of outfalls and interconnections, catchment investigations for evidence of illicit discharges, and provide the basis for determining permit milestones. Major factors considered in the prioritization and ranking of catchments include:

- Past discharge complaints and reports
- Receiving water quality, including any dry weather sampling conducted under the 2003 MS4 Permit
- Density of generating sites as it relates to commercial and industrial sites
- Age of development and infrastructure
- Culverted streams
- Water body impairments

This inventory and ranking have been documented in the Town's IDDE Plan and will be updated annually throughout the permit term to reflect new findings from dry and wet-weather sampling and other IDDE program activities, and will be documented in the Town's MS4 Annual Reports.

#### 4.1.3 Field Investigation

The MS4 Permit requires the Town to develop a storm drain network investigation that involves systematically and progressively observing, sampling and evaluating key junction manholes in the MS4 to determine the approximate location of suspected illicit discharges.

Once the source of an illicit discharge is approximated between two manholes, more detailed investigation techniques will be used to isolate and confirm the source of the illicit discharge. The following methods may be used in isolating and confirming the source of illicit discharges:

- Sandbagging - If no flow is observed at a particular junction manhole or key junction manhole at the time of inspection, the drain segment in the area of concern can be isolated by placing sandbags within outlets to manholes to form a temporary dam that collects any intermittent flow for a 24 to 48-hour dry weather period to determine if any intermittent dry-weather flow is present. If intermittent flow is captured, grab samples will be collected and analyzed at a minimum for ammonia, chlorine, and surfactants. If it is determined that no flow is captured behind the sandbag after a 24 to 48-hour period, the tributary drainage pipes can be excluded as the source of any intermittent discharge.
- Dye Testing - dyed water is poured into plumbing fixtures and downstream drainage is observed to confirm connections.
- ZoomCam Inspections - in selected tributary areas, or where indicated based on findings from other field investigation work, drainage structures will be inspected with a "zoom camera-on-a-stick" in an attempt to gather additional information and narrow the location of observed dry-weather flow.
- Smoke Testing - non-toxic smoke is introduced into drainage segments containing suspected illicit discharges and adjacent buildings are observed for signs of a connection, or smoke emanating from floor drains or sump pump connections.
- CCTV/Video Inspections - drainage pipes are internally inspected to pinpoint and evaluate connections through the use of a closed-circuit television camera through all or a portion of the drain segment believed to contain the connection.

Upon location of an illicit discharge, the Town will work to eliminate the illicit discharge as expeditiously as possible. When the specific source of an illicit discharge is identified, the Town will exercise its authority as necessary to require its removal. The Town will notify all responsible parties of any such discharge and require immediate cessation of improper disposal practices in accordance with its legal authorities.

## 5.0 STANDARD OPERATING PROCEDURES

### 5.1 MS4 Permit Requirement

As part of the minimum control measure for Pollution Prevention/Good Housekeeping for Municipal Operations, the MS4 Permit requires permittees to implement an Operations and Maintenance (O&M) program for permittee-owned facilities and activities to prevent or reduce pollutant runoff and protect water quality. The O&M Program is required to include the following elements:

- 1) An inventory of all permittee-owned facilities.
- 2) Written O&M procedures for the following activities:
  - a. Parks and open space
  - b. Buildings and facilities where pollutants are exposed to runoff
  - c. Vehicles and equipment
- 3) A written program detailing the activities and procedures the permittee will implement so that MS4 infrastructure is maintained in a timely manner to reduce the discharge of pollutants from the MS4, to include:
  - a. Optimization of routine inspections, cleaning and maintenance of catch basins.
  - b. Implementation of procedures for sweeping and/or cleaning streets, and permittee-owned parking lots.
  - c. Proper storage and disposal of catch basin cleanings and street sweepings.
  - d. Implementation of procedures for winter road maintenance.
  - e. Implementation of inspection and maintenance frequencies and procedures for storm drain systems and stormwater treatment structures.
- 4) Written records for all maintenance activities, inspections and training.

### 5.2 Inventory of Municipal Facilities

Wenham has developed a comprehensive Operations and Maintenance Plan (O&M) Plan to meet permit requirements, included in Appendix L. The inventory of municipally-owned facilities and property, including vehicles, equipment, and stormwater treatment structures is included in Appendix C of the O&M Plan.

### 5.3 Operation and Maintenance Procedures for Municipal Activities and Facilities

To address the MS4 Permit requirements, Standard Operating Procedures (SOPs) associated with the identified municipal activities and facilities are required to be developed within two years of the permit effective date, except for procedures for winter road maintenance, which are required to be developed within one year of the permit effective date. The SOP for winter road maintenance, which includes snow removal and deicing, is included in Appendix I. All required SOPs were developed during Permit Years 1 and 2 and are appended in Appendix I of this SWMP.

#### 5.4 Catch Basin Cleaning and Optimization

The town currently has approximately 581 catch basins. Catch basin cleaning is completed annually. To meet anticipated requirements of the new MS4 Permit, the town will need to optimize catch basin inspection, cleaning and maintenance such that the following conditions are met:

- Inspection and maintenance of catch basins located near construction activities (roadway construction, residential, commercial, or industrial development or redevelopment) are prioritized. Catch basins in such areas must be cleaned more frequently if inspection and maintenance activities indicate excessive sediment or debris loading.
- A schedule must be established such that the frequency of routine cleaning ensures that no catch basin at any time will be more than 50 percent full. A catch basin sump is more than 50 percent full if the contents within the sump exceed one half the distance between the bottom interior of the catch basin to the invert of the deepest outlet of the catch basin.
- If a catch basin sump is more than 50 percent full during two consecutive routine inspections/cleaning events, the town must document the finding, investigate the contributing drainage area for sources of excessive sediment loading, and to the extent practicable, abate contributing sources.
- The town shall maintain documentation, including metrics and other information, used to reach the determination that the established plan for cleaning and maintenance is optimal and meets the requirements of the MS4 Permit, including a log of catch basins cleaned and inspected.
- The town must track and report the following information to EPA annually:
  - Total number of catch basins town-wide
  - Number of catch basins inspected
  - Number of catch basins cleaned
  - Total volume or mass of material removed from all catch basins

The Town collected data for their catch basin cleaning optimization plan in 2019 to ensure that no catch basin is more than 50% full. The Town generally cleans 100% of their catch basins annually. The Town will collect additional data during the 2021 cleaning seasons to complete their optimization plan. Data collected will include depth from the catch basin rim to the top of sediment, to the bottom of the basin, and to the invert of the outlet pipe. This data will be integrated into the Town's GIS and utilized to identify those catch basins that are filling up more frequently, and will therefore need to be cleaned more than once annually to ensure that the catch basin sump is never more than 50% full

## 6.0 TMDLS AND WATER QUALITY LIMITED WATERS

### 6.1 Bacteria/Pathogens

According to the Massachusetts' Year 2016 Integrated List of Waters, the Miles River (MA92-03) is no longer impaired for bacteria or pathogens.

## 7.0 REPORTING, EVALUATION AND MODIFICATION

### 7.1 MS4 Permit Reporting

The MS4 Permit requires submission of annual reports assessing the effectiveness of the proposed BMPs and reporting if the minimum control measures were met. The initial report is due 90 days from the close of the reporting period, or September 29<sup>th</sup>, 2019, and annually thereafter. Reports are to be submitted to both EPA and MADEP. At a minimum, the report should include the following:

- The status of compliance with permit conditions, including an assessment of the appropriateness of the selected BMPs and progress toward achieving the selected measurable goals for each minimum control measure.
- Results of any information collected and analyzed, including monitoring data, if any. Outfall screening and monitoring data collected shall be submitted for both the reporting cycle and cumulative for the permit term.
- A summary of the stormwater activities planned for the next reporting cycle.
- A change in any identified best management practices or measurable goals for any minimum control measure.
- Notice of relying on another governmental entity to satisfy some of the permit obligations, if applicable.

As indicated in an earlier section, copies of past annual reports submitted by Wenham are referenced in Appendix E of this SWMP. Wenham will append future annual reports in compliance with the 2016 MS4 Permit as they are prepared in Appendix J.

### 7.2 Evaluation of SWMP Success

This SWMP should be considered a dynamic document that is modified as necessary to account for changes such as in drainage infrastructure, laws and regulations, and town leadership and policy. The success of programs implemented by the SWMP – such as IDDE – should also be evaluated to ensure that they are accomplishing the goals for which they were intended and in a method and timetable that continues to be appropriate. In addition, the SWMP should be reviewed and revised as necessary to keep text and appendices current. For example:

- After each year of stormwater monitoring to update appended findings and priorities.
- As needed to keep appended IDDE investigation, identification and removal documentation current.
- After each NPDES stormwater permit renewal to incorporate new requirements, as well as append copies of new permits and associated Notices of Intent (NOIs).

- After adoption of any new or revised ordinances or other regulatory mechanisms related to stormwater or drainage infrastructure.

Wenham undertook this SWMP, in part, in order to ensure the protection of its water resources and the large investment in drainage infrastructure. Periodic review and revision of this written document will help achieve these goals on a perpetual basis.

### 7.3 Modifications to the SWMP or Notice of Intent

As discussed above, minor modifications to this SWMP should be made on a regular and frequent basis to keep it current. However, major changes to the SWMP or needed modifications to the NOI for inclusion under the NPDES Permit require an official process. In accordance with the MS4 Permit, modifications to the SWMP or NOI may be made under the following provisions:

- At any time, the town may add (but not subtract or replace) components, controls or requirements to the SWMP if written notification is made to EPA and MADEP.
- The town may request to replace an ineffective or infeasible BMP specifically identified in the SWMP with an alternative BMP at any time if the request is made in writing to EPA and MADEP. Unless the request is denied, changes proposed in accordance with the criteria below shall be deemed approved and may be implemented 60 days from submittal of the request. If the request is denied, EPA or MADEP, as applicable, will send the town a written explanation of the denial.
- Modification requests must include the following information:
  - An analysis of why the BMP is ineffective or infeasible (or cost prohibitive).
  - Expectations on the effectiveness of the replacement BMP.
  - An analysis of why the replacement BMP is expected to achieve the goals of the BMP to be replaced.
- Change requests or notifications must be made in writing to EPA (with copy to MADEP) and signed in accordance with EPA signatory requirements.

Wenham does not anticipate any major modifications to the SWMP or NOI requiring official notification.

## APPENDIX A

### Abbreviations and Definition

**ABBREVIATIONS AND DEFINITIONS**

**Best Management Practices (BMPs)** - schedules of activities, practices (and prohibitions of practices), structures, vegetation, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

**Common Plan of Development** - A "larger common plan of development or sale" is a contiguous area where multiple separate and distinct construction activities may be taking place at different times different schedules under one plan. For example, if developer buys a 20-acre lot and builds roads, installs pipes, and runs electricity with the intention of constructing homes or other structures sometime in the future, this would be considered a larger common plan of development or sale. If the land is parceled off or sold, and construction occurs on plots that are less than one acre by separate, independent builders, this activity still would be subject to stormwater permitting requirements if the smaller plots were included on the original site plan.

**Control Measure** - refers to any BMP or other method (including effluent limitations) used to prevent or reduce the discharge of pollutants to waters of the United States.

**Director** - a Regional Administrator of the Environmental Protection Agency or an authorized representative.

**Discharge** - when used without qualification, means the "discharge of a pollutant."

**Discharge of a pollutant** - any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source," or any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation. This includes additions of pollutants into waters of the United States from surface runoff which is collected or channeled by man; or discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works.

**Discharge-related activities** - activities which cause, contribute to, or result in stormwater and allowable non-stormwater point source discharges, and measures such as the siting, construction and operation of BMPs to control, reduce, or prevent pollution in the discharges.

**Disturbance** - action to alter the existing vegetation and/or underlying soil of a site, such as clearing, grading, site preparation (e.g., excavating, cutting, and filling), soil compaction, and movement and stockpiling of top soils.

**Existing Discharger** – an operator applying for coverage under this permit for discharges covered previously under an NPDES general or individual permit.

**Facility or Activity** - any NPDES "point source" or any other facility or activity (including land or appurtenances thereto) that is subject to regulation under the NPDES program.

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**Federal Facility** – Any buildings, installations, structures, land, public works, equipment, aircraft, vessels, and other vehicles and property, owned by, or constructed or manufactured for the purpose of leasing to, the federal government.

**Illicit Discharge** - any discharge to a municipal separate storm sewer that is not composed entirely of stormwater except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.

**Impaired Water** – A water is impaired if it does not meet one or more of its designated use(s). For purposes of this permit, “impaired” refers to categories 4 and 5 of the five-part categorization approach used for classifying the water quality standards attainment status for water segments under the TMDL program. Impaired waters compilations are also sometimes referred to as “303(d) lists.” Category 5 waters are impaired because at least one designated use is not being supported or is threatened and a TMDL is needed. Category 4 waters indicate that at least one designated use is not being supported but a TMDL is not needed (4a indicates that a TMDL has been approved or established by EPA; 4b indicates other required control measures are expected in result in the attainment of water quality standards in a reasonable period of time; and 4c indicates that the nonattainment of the water quality standard is the result of pollution (e.g. habitat) and is not caused by a pollutant). See USEPA’s 2006 Integrated Report Guidance, July 29, 2005 for more detail on the five-part categorization of waters [under EPA National TMDL Guidance <http://www.epa.gov/owow/tmdl/policy.html>].

**Impervious Surface**- Any surface that prevents or significantly impedes the infiltration of water into the underlying soil. This can include but is not limited to: roads, driveways, parking areas and other areas created using non porous material; buildings, rooftops, structures, artificial turf and compacted gravel or soil.

**Industrial Activity** - the ten categories of industrial activities included in the definition of “stormwater discharges associated with industrial activity,” as defined in 40 CFR 122.26(b)(14)(i)-(ix) and (xi).

**Industrial Stormwater** - stormwater runoff associated with the definition of “stormwater discharges associated with industrial activity.”

**Interconnection** – the point (excluding sheet flow over impervious surfaces) where the permittee’s MS4 discharges to another MS4 or other storm sewer system, through which the discharge is eventually conveyed to a water of the United States. Interconnections shall be treated similarly to outfalls throughout the permit.

**Junction Manhole** - For the purposes of this permit, a junction manhole is a manhole or structure with two or more inlets accepting flow from two or more MS4 alignments. Manholes with inlets solely from private storm drains, individual catch basins, or both are not considered junction manholes for these purposes.

**Key Junction Manhole** - For the purposes of this permit, key junction manholes are those junction manholes that can represent one or more junction manholes without compromising adequate

implementation of the illicit discharge program. Adequate implementation of the illicit discharge program would not be compromised if the exclusion of a particular junction manhole as a key junction manhole would not affect the permittee's ability to determine the possible presence of an upstream illicit discharge. A permittee may exclude a junction manhole located upstream from another located in the immediate vicinity or that is serving a drainage alignment with no potential for illicit connections.

**Municipal Separate Storm Sewer** - a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designed or used for collecting or conveying stormwater;(iii) Which is not a combined sewer; and (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

**Municipal Separate Storm Sewer System (MS4)** - means all separate storm sewers that are defined as "large" or "medium" or "small" municipal storm sewer systems pursuant to paragraphs 40 CFR 122.26 (b)(4) and (b)(7), or designated under paragraph 40 126.26(a) (1)(v). For the purposes of this permit "MS4" may also refer to the permittee with jurisdiction over the sewer system.

**New Development** – any construction activities or land alteration resulting in total earth disturbances greater than 1 acre (or activities that are part of a larger common plan of development disturbing greater than 1 acre) on an area that has not previously been developed to include impervious cover. (see part 2.3.6. of the permit)

**New Discharger** – For the purposes of this permit, a new discharger is an entity that discharges stormwater from a new facility with an entirely new separate storm sewer system that is not physically located on the same or adjacent land as an existing facility and associated system operated by the same MS4.

**New Source** - any building, structure, facility, or installation from which there is or may be a "discharge of pollutants," the construction of which commenced:

- after promulgation of standards of performance under section 306 of the CWA which are applicable to such source, or
- after proposal of standards of performance in accordance with section 306 of the CWA which are applicable to such source, but only if the standards are promulgated in accordance with section 306 within 120 days of their proposal.

**No exposure** - all industrial materials or activities are protected by a storm-resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff.

**One Lane Width** – The width of the travel lane for a roadway. Lane width does not include shoulders, curbs, and on-street parking areas.

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**Outfall Catchment** – The land area draining to a single outfall or interconnection. The extent of an outfall's catchment is determined not only by localized topography and impervious cover but also by the location of drainage structures and the connectivity of MS4 pipes.

**Owner or operator** - the owner or operator of any “facility or activity” subject to regulation under the NPDES program.

**Person** - an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof.

**Point source** - any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.

**Pollutant** - dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal and agricultural waste discharged into water.

**Pollutant of concern** – A pollutant which causes or contributes to a violation of a water quality standard, including a pollutant which is identified as causing an impairment in a State's 303(d) list.

**Redevelopment** – for the purposes of part 2.3.6., any construction, land alteration, or improvement of impervious surfaces resulting in total earth disturbances greater than 1 acre (or activities that are part of a larger common plan of development disturbing greater than 1 acre) that does not meet the definition of new development (see above).

**Runoff coefficient** - the fraction of total rainfall that will appear at the conveyance as runoff.

**Site** – for the purposes of part 2.3.6., the area extent of construction activities, including but not limited to the creation of new impervious cover and improvement of existing impervious cover (e.g. repaving not covered by 2.3.6.a.ii.4.d.)

**Small Municipal Separate Storm Sewer System** – all separate storm sewer systems that are (i) owned or operated by the United States, a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district, or drainage district, or similar entity or an Indian tribe or an authorized Indian tribal organization or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States, and (ii) not defined as “large” or “medium” municipal separate storm sewer system pursuant to paragraphs 40 CFR 122.26 (b)(4) and (b)(7), or designated under paragraph 40 126.26(a) (1)(v). This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. This term does not include separate storm sewers in very discrete areas, such as individual buildings.

**Small MS4** – means a small municipal separate storm sewer system.

**Stormwater** - stormwater runoff, snow melt runoff, and surface runoff and drainage.

**Stormwater Discharges Associated with Construction Activity** - a discharge of pollutants in stormwater runoff from areas where soil disturbing activities (e.g., clearing, grading, or excavating), construction materials, or equipment storage or maintenance (e.g., fill piles, borrow areas, concrete truck washout, fueling), or other industrial stormwater directly related to the construction process (e.g., concrete or asphalt batch plants) are located. (See 40 CFR 122.26(b)(14)(x) and 40 CFR 122.26(b)(15).

**Stormwater Discharges Associated with Industrial Activity** - the discharge from any conveyance that is used for collecting and conveying stormwater and that is directly related to manufacturing, processing or raw materials storage areas at an industrial plant. The term does not include discharges from facilities or activities excluded from the NPDES program under Part 122. For the categories of industries identified in this section, the term includes, but is not limited to, stormwater discharges from industrial plant yards; immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility; material handling sites; refuse sites; sites used for the application or disposal of process waste water (as defined at part 401 of this chapter); sites used for the storage and maintenance of material handling equipment; sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials, and intermediate and final products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to stormwater. For the purposes of this paragraph, material handling activities include storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product, by-product or waste product. The term excludes areas located on plant lands separate from the plant's industrial activities, such as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with stormwater drained from the above described areas. Industrial facilities include those that are federally, State, or municipally owned or operated that meet the description of the facilities listed in Appendix D of this permit. The term also includes those facilities designated under the provisions of 40 CFR 122.26(a)(1)(v).

**Total Maximum Daily Loads (TMDLs)** - A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. A TMDL includes wasteload allocations (WLAs) for point source discharges, load allocations (LAs) for nonpoint sources and/or natural background, and must include a margin of safety (MOS) and account for seasonal variations. (See section 303(d) of the Clean Water Act and 40 CFR 130.2 and 130.7).

**Urbanized Area** – US Census designated area comprised of a densely settled core of census tracts and/or census blocks that meet minimum population density requirements, along with adjacent territory containing non-residential urban land uses as well as territory with low population density included to link outlying densely settled territory with the densely settled core. For the purposes of this permit, Urbanized Areas as defined by any Census since 2000 remain subject to stormwater regulation even if there is a change in the reach of the Urbanized Area because of a change in more recent Census data.

**Water Quality Limited Water** – for the purposes of this permit, a water quality limited water is any waterbody that does not meet applicable water quality standards, including but not limited to waters listed in categories 5 or 4b on the Massachusetts Integrated Report of waters listed pursuant to Clean Water Act section 303(d) and 305(b).

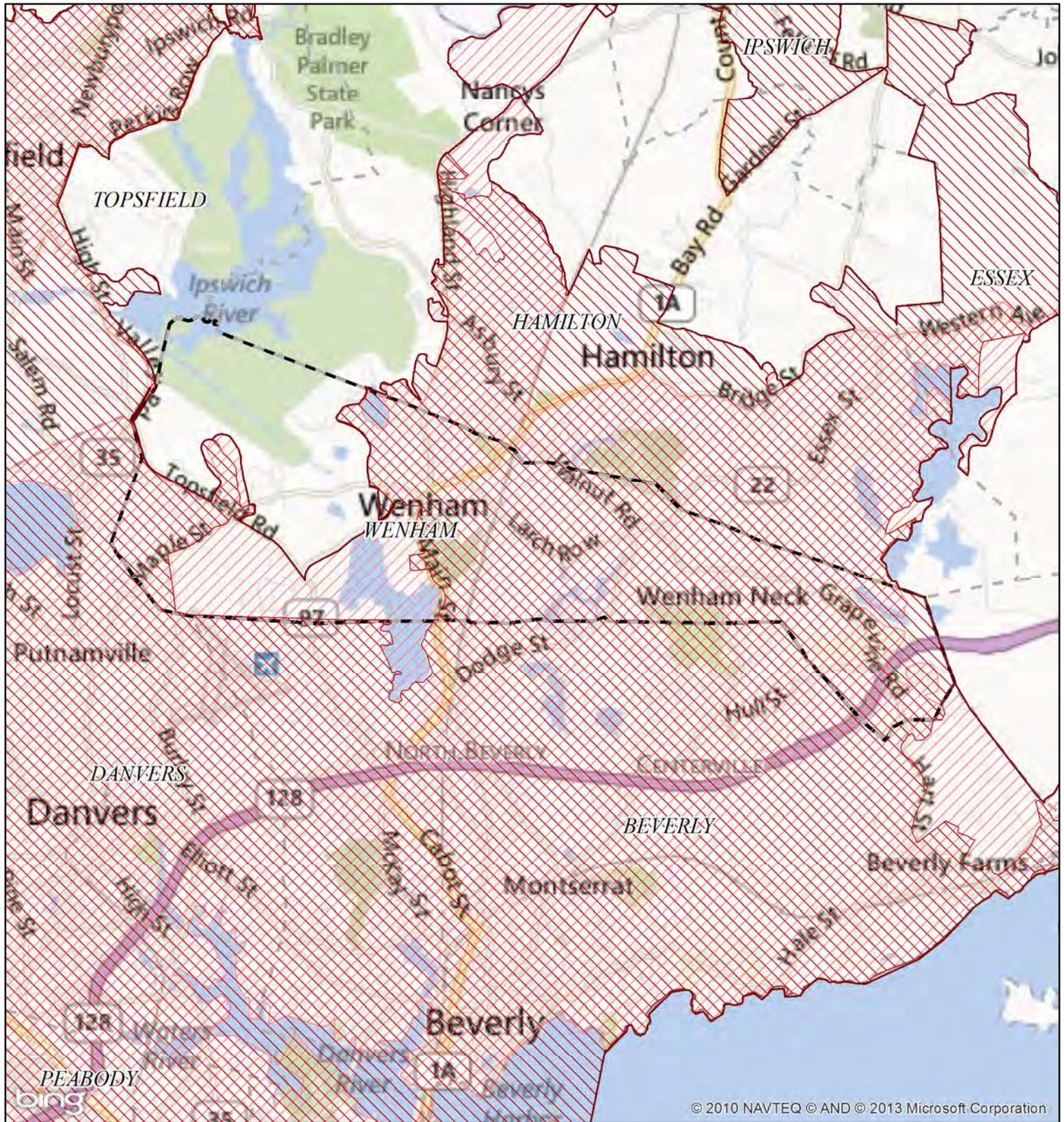
**Water Quality Standards** - A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses. States and EPA adopt WQS to protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act (See CWA sections 101(a)2 and 303(c)).

#### ABBREVIATIONS AND ACRONYMS

BMP – Best Management Practice  
 BPJ – Best Professional Judgment  
 CGP – Construction General Permit  
 CWA – Clean Water Act (or the Federal Water Pollution Control Act, 33 U.S.C. §1251 et seq)  
 DCIA – Directly Connected Impervious Area  
 EPA – U. S. Environmental Protection Agency  
 ESA – Endangered Species Act  
 USFWS – U. S. Fish and Wildlife Service  
 IA – Impervious Area  
 IDDE – Illicit Discharge Detection and Elimination  
 LA – Load Allocations  
 MS4 – Municipal Separate Storm Sewer System  
 MSGP – Multi-Sector General Permit  
 NHPA – National Historic Preservation Act  
 NMFS – U. S. National Marine Fisheries Service  
 NOI – Notice of Intent  
 NPDES – National Pollutant Discharge Elimination System  
 NRHP – National Register of Historic Places  
 NSPS – New Source Performance Standard  
 PCP – Phosphorus Control Plan  
 SHPO – State Historic Preservation Officer  
 SPCC – Spill Prevention, Control, and Countermeasure  
 SWMP – Stormwater Management Program  
 SWPPP – Stormwater Pollution Prevention Plan  
 TMDL – Total Maximum Daily Load  
 TSS – Total Suspended Solids  
 WLA – Wasteload Allocation  
 WQS – Water Quality Standard

## APPENDIX B

### Regulated Area Map



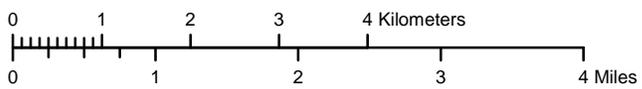
© 2010 NAVTEQ © AND © 2013 Microsoft Corporation



### NPDES Phase II Stormwater Program Automatically Designated MS4 Areas

#### Wenham MA

Regulated Area:



Town Population: 4869  
Regulated Population: 4260  
(Populations estimated from 2010 Census)



Urbanized Areas, Town Boundaries:  
US Census (2000, 2010)  
Base map © 2013 Microsoft Corporation  
and its data suppliers

## APPENDIX C

2016 MS4 Permit

### Minor Permit Modification Summary

The following permit has been modified in accordance with 40 CFR §122.63:

Permit Name: GENERAL PERMITS FOR STORMWATER DISCHARGES FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS IN MASSACHUSETTS

Issue date: April 4, 2016

Effective Date: July 1, 2018

The following minor modifications were made on November 7, 2018:

Page	Modification
2	Table of Contents was updated to reflect the changes below
3	Table of Contents was updated to reflect the changes below
5	Line was added before first bullet point for consistency
6	Line was removed between parts for consistency
8	Lines were added and removed between parts for consistency
8	Typos were fixed
11	Extra word was removed
11	Extra spaces were removed between words for consistency
12	Extra spaces were removed between words for consistency
12	Extra words were removed
12	Text was moved to a bullet point in the last paragraph of part 1.10.2 instead of as part of the 1.10.3 title for consistency
12	Duplicate words and symbols were deleted
13	Bullets were moved to the correct subsection, consistent with other relevant sections of the permit
14	Typos were fixed
15	Extra spaces were removed between words for consistency
16	Extra spaces were removed between words for consistency
27	Extra spaces were removed between words for consistency
27	Duplicate character was removed
29	Typo was fixed
30	Duplicate character was removed
32	Lines were added before bullet points for consistency
33	Lines were added and removed between paragraphs for consistency
34	Line was added before bullet points for consistency
34	Typo was fixed
34	Duplicate spaces were removed
35	Typo was fixed
35	Line was added before bullet points for consistency
36	Lines were added before bullet points and in between parts for consistency
37	Lines were added before bullet points and in between parts for consistency
38	Line was added in between parts for consistency
38	Typos were fixed

39	Line was added in between paragraphs for consistency
39	Typos were fixed
41	Lines were added before bullets for consistency
42	Typos were fixed
43	Typo was fixed
44	Line was added for consistency
46	Typo was fixed
50	Typo was fixed
51	Typo was fixed
54	Line was added for consistency
55	Line was added for consistency
56	Typo was fixed
56	Line was added for consistency
57	Lines were added and removed for consistency

**United States Environmental Protection Agency (EPA)  
National Pollutant Discharge Elimination System (NPDES)**

**GENERAL PERMITS FOR STORMWATER DISCHARGES FROM  
SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS  
IN MASSACHUSETTS**

**AUTHORIZATION TO DISCHARGE UNDER THE  
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM**

In compliance with the provisions of the Clean Water Act (CWA), as amended (33 U.S.C. §1251 *et seq.*), and the Massachusetts Clean Waters Act, as amended (M.G.L. Chap.21 §§ 26-53), any operator of a small municipal separate storm sewer system whose system:

- Is located in the areas described in part 1.1;
- Is eligible for coverage under part 1.2 and part 1.9; and
- Submits a complete and accurate Notice of Intent in accordance with part 1.7 of this permit and EPA issues a written authorization

is authorized to discharge in accordance with the conditions and the requirements set forth herein.

The following appendices are also included as part of these permits:

- Appendix A – Definitions, Abbreviations, and Acronyms;
- Appendix B – Standard permit conditions applicable to all authorized discharges;
- Appendix C – Endangered Species Act Eligibility Guidance;
- Appendix D – National Historic Preservation Act Eligibility Guidance;
- Appendix E – Information required for the Notice of Intent (NOI);
- Appendix F – Requirements for MA Small MS4s Subject to Approved TMDLs;
- Appendix G – Impaired Waters Monitoring Parameter Requirements;
- Appendix H – Requirements related to discharges to certain water quality limited waterbodies;

These permits become effective on **July 1, 2017**.

These permits and the authorization to discharge expire at midnight, **June 30, 2022**.

Signed this 4<sup>th</sup> day of April, 2016

  
\_\_\_\_\_  
Ken Moraff, Director  
Office of Ecosystem Protection  
United States Environmental Protection Agency  
5 Post Office Square – Suite 100  
Boston, Massachusetts 02109-3912

Signed this 4<sup>th</sup> day of April 2016

  
\_\_\_\_\_  
Douglas E. Fine  
Assistant Commissioner for Water  
Resources  
Department of Environmental Protection  
One Winter Street  
Boston, Massachusetts 02108

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## 1.0. Introduction

This document consists of three (3) general permits listed in part 1.1. Each general permit is applicable to a particular type of municipal system within Massachusetts. Many of the permit terms and conditions are applicable across all regulated entities, and therefore are presented just once in parts 1-2, part 4, and Appendices A through E. Other conditions are applicable to a particular set of authorized entities; these terms and conditions are included in parts 3, and 5 and Appendices F through H. Throughout the permit, the terms “this permit” or “the permit” will refer to the three general permits.

## 1.1. Areas of Coverage

This permit covers small municipal separate storm sewer systems (MS4s) located in the Commonwealth of Massachusetts:

- Traditional Cities and Towns (NPDES Permit No. MAR041000)
- State, federal, county and other publicly owned properties (Non-traditional) (MAR042000)
- State transportation agencies (except for MassDOT- Highway Division) (MAR043000)

## 1.2. Eligibility

The MS4 shall meet the eligibility provisions described in part 1.2.1 and part 1.9 to be eligible for authorization under this permit.

### 1.2.1. Small MS4s Covered

This permit authorizes the discharge of stormwater from small MS4s as defined at 40 CFR § 122.26(b) (16). This includes MS4s described in 40 CFR §122.32(a) (1) and (a) (2). An MS4 is eligible for coverage under this permit if it is:

- A small MS4 within the Commonwealth of Massachusetts;
- Not a large or medium MS4 as defined in 40 CFR §§122.26(b)(4) or (7);
- Located either fully or partially within an urbanized area as determined by the latest Decennial Census by the Bureau of Census as of the effective date of this permit (the 2010 Census); or
- Located in a geographic area designated by EPA as requiring a permit.

If the small MS4 is not located entirely within an urbanized area, only the portion of the MS4 that is located within the urbanized area is regulated under 40 CFR §122.32(a) (1).

A small municipal separate storm sewer system means all separate storm sewers that are:

- Owned or operated by the United States, a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States.
- Not defined as large or medium municipal separate storm sewer systems pursuant to 40 CFR § 122.26(b) (4) and (b) (7) or designated under 40 CFR § 122.26(a) (1) (v).
- This term includes systems similar to separate storm sewer systems in municipalities such as systems at military bases, large hospitals or prison complexes, and highways

and other thoroughfares. The term does not include separate storm sewers in very discrete areas, such as individual buildings.

### 1.3. Limitations on Coverage

This permit does not authorize the following:

- a. Stormwater discharges mixed with sources of non-stormwater unless such non-stormwater discharges are:
  - Authorized under a separate NPDES permit; or
  - A non-stormwater discharge as listed in part 1.4.
- b. Stormwater discharges associated with industrial activity as defined in 40 CFR §122.26 (b) (14) (i)-(ix) and (xi).
- c. Stormwater discharges associated with construction activity as defined in 40 CFR §122.26(b) (14) (x) or (b) (15).
- d. Stormwater discharges currently authorized under another NPDES permit, including discharges covered under other regionally issued general permits.
- e. Stormwater discharges or discharge related activities that are likely to adversely affect any species that are listed as endangered or threatened under the Endangered Species Act (ESA) or result in the adverse modification or destruction of habitat that is designated as critical under the ESA. The permittee shall follow the procedures detailed in Appendix C to make a determination regarding eligibility. The permittee shall certify compliance with this provision on the submitted NOI.
- f. Stormwater discharges whose direct or indirect impacts do not prevent or minimize adverse effects on any Essential Fish Habitat.
- g. Stormwater discharges, or implementation of a stormwater management program, which adversely affects properties listed or eligible to be listed on the National Register of Historic Places. The permittee shall follow the procedures detailed in Appendix D to make a determination regarding eligibility. The permittee shall certify compliance with this provision on the submitted NOI.
- h. Stormwater discharges prohibited under 40 CFR § 122.4.
- i. Stormwater discharges to the subsurface subject to state Underground Injection Control (UIC) regulations. Although the permit includes provisions related to infiltration and groundwater recharge, structural controls that dispose of stormwater into the ground may be subject to UIC regulation requirements. Authorization for such discharges shall be obtained from Massachusetts Department of Environmental Protection, Bureau of Resource Protection, Drinking Water Program, Underground Injection Control, One Winter Street, Boston, MA 02108 – phone 617-292-5859.
- j. Any non-traditional MS4 facility that is a “new discharger” as defined in part 5.1.4. and discharges to a waterbody listed in category 5 or 4b on the Massachusetts Integrated Report of waters listed pursuant to Clean Water Act section 303(d) and 305(b) due to nutrients (Total Nitrogen or (Total Phosphorus), metals (Cadmium, Copper, Iron, Lead or Zinc), solids (TSS or Turbidity), bacteria/pathogens (E. Coli, Enterococcus or Fecal Coliform), chloride (Chloride) or oil and grease

## MA MS4 General Permit

(Petroleum Hydrocarbons or Oil and Grease), or discharges to a waterbody with an approved TMDL for any of those pollutants.

### 1.4. Non-Stormwater Discharges

The following categories of non-stormwater discharges are allowed under this permit *unless* the permittee, EPA, or the MassDEP identifies any category or individual discharge of non-stormwater discharge in part 1.4.a-r as a significant contributor of pollutants to the MS4, then that category or individual discharge is not allowed under part 1.4, but rather shall be deemed an “illicit discharge” under part 2.3.4.1, and the permittee shall address that category or individual discharge as part of the Illicit Discharge Detection and Elimination (IDDE) Program described in part 2.3.4 of this permit.

- a. Water line flushing
- b. Landscape irrigation
- c. Diverted stream flows
- d. Rising ground water
- e. Uncontaminated ground water infiltration (as defined at 40 CFR § 35.2005(20))
- f. Uncontaminated pumped ground water
- g. Discharge from potable water sources
- h. Foundation drains
- i. Air conditioning condensation
- j. Irrigation water, springs
- k. Water from crawl space pumps
- l. Footing drains
- m. Lawn watering
- n. Individual resident car washing
- o. Flows from riparian habitats and wetlands
- p. De-chlorinated swimming pool discharges
- q. Street wash waters
- r. Residential building wash waters without detergents

Discharges or flows from firefighting activities are allowed under this permit need only be addressed where they are identified as significant sources of pollutants to waters of the United States.

### 1.5. Permit Compliance

Non-compliance with any of the requirements of this permit constitutes a violation of the permit and the CWA and may be grounds for an enforcement action and may result in the imposition of injunctive relief and/or penalties.

### 1.6. Continuation of this Permit

If this permit is not reissued prior to the expiration date, it will be administratively continued in accordance with the Administrative Procedure Act and remain in force and effect for discharges that were authorized prior to expiration. If a small MS4 was granted permit authorization prior to the expiration date of this permit, it will automatically remain authorized by this permit until the earliest of:

- Authorization under a reissued general permit following timely and appropriate submittal of a complete and accurate NOI requesting authorization to discharge under the reissued permit; or
- Issuance or denial of an individual permit for the MS4’s discharges; or

## MA MS4 General Permit

- Authorization or denial under an alternative general permit.

If the MS4 operator does not submit a timely, appropriate, complete, and accurate NOI requesting authorization to discharge under the reissued permit or a timely request for authorization under an individual or alternative general permit, authorization under this permit will terminate on the due date for the NOI under the reissued permit unless otherwise specified in the reissued permit.

### **1.7. Obtaining Authorization to Discharge**

#### **1.7.1. How to Obtain Authorization to Discharge**

To obtain authorization under this permit, a small MS4 shall:

- Be located in the areas listed in part 1.1 of this permit;
- Meet the eligibility requirements in part 1.2 and part 1.9;
- Submit a complete and accurate Notice of Intent (NOI) in accordance with the requirements of part 1.7.2; and
- EPA issues a written authorization.

#### **1.7.2. Notice of Intent**

- a. Operators of Small MS4s seeking authorization to discharge under the terms and conditions of this permit shall submit a Notice of Intent that contains the information identified in Appendix E. This includes operators of small MS4s that were previously authorized under the May 1, 2003 small MS4 general permit (MS4-2003 permit).
- b. The NOI shall be signed by an appropriate official (see Appendix B, Subparagraph B.11, Standard Conditions).
- c. The NOI shall contain the following 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 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.

Print the name and title of the official, followed by signature and date.

- d. The NOI shall be submitted within 90 days of the effective date of the permit. If EPA notifies an MS4 that it is designated under 40 CFR § 122.32(a) (2) or (b), the NOI shall be submitted within 180 days of receipt of notice unless granted a longer period of time by EPA.

#### **1.7.3. Submission of Notice of Intent**

- a. All small MS4s shall submit a complete and accurate Notice of Intent (suggested form in Appendix E) to EPA-Region 1 at the following address:

United States Environmental Protection Agency  
Stormwater and Construction Permits Section (OEP06-1)  
Five Post Office Square, Suite 100

Boston, MA 02109

Or submitted electronically to EPA at the following email address: [stormwater.reports@epa.gov](mailto:stormwater.reports@epa.gov)

b. All small MS4s shall also submit a copy of the NOI to the MassDEP at the following address:

Massachusetts Department of Environmental Protection  
One Winter Street -5th Floor  
Boston, Massachusetts 02108  
ATTN: Frederick Civian, Stormwater Coordinator

c. Late notification: A small MS4 is not prohibited from submitting a NOI after the dates provided in part 1.7.2.d. However, if a late NOI is submitted, authorization is only for discharges that occur after permit authorization is granted. EPA and MassDEP reserve the right to take enforcement actions for any unpermitted discharges. All NOIs submitted after December 21, 2020 must be submitted electronically.

#### **1.7.4. Public Notice of NOI and Effective Date of Coverage**

a. EPA will provide a public notice and opportunity for comment on the contents of the submitted NOIs. The public comment period will be a minimum of 30 calendar days.

b. Based on a review of a small MS4's NOI or other information, EPA may grant authorization, extend the public comment period, or deny authorization under this permit and require submission of an application for an individual or alternative NPDES permit. (See part 1.8) A small MS4 will be authorized to discharge under the terms and conditions of this permit upon receipt of notice of authorization from EPA.

c. Permittees whose authorization to discharge under the MS4-2003 permit, which expired on May 1, 2008, has been administratively continued in accordance with the Administrative Procedure Act 5 U.S.C. § 558(c) and 40 CFR § 122.6, who wish to obtain coverage under this permit, must submit a new NOI requesting permit coverage in accordance with the requirements of part 1.7 of this permit to EPA within 90 days after the effective date of this permit. Permittees whose authorization to discharge under the expired MS4-2003 permit was administratively continued, who fail to submit a timely, complete and accurate NOI or an application for an individual NPDES permit within 90 days after the effective date of this permit will be considered to be discharging without a permit (see 40 CFR § 122.28(b)(3)(iii)).

#### **1.8. Individual Permits and Alternative General Permits**

a. EPA may require a small MS4 to apply for and obtain authorization under either an individual NPDES permit or an alternative NPDES general permit. Any interested person may petition EPA in accordance with the provisions of 40 CFR § 122.26(f) to require a small MS4 to apply for and/or obtain authorization under either an individual NPDES permit or an alternative NPDES general permit. If EPA requires a small MS4 to apply for an individual or alternative NPDES permit, EPA will notify the small MS4 in writing that a permit application is required. This notification will include a brief statement of the reasons for this decision and will provide application information and an application deadline. If a small MS4 is authorized under the MS4-2003 permit or this permit and fails to submit an individual NPDES or an alternative general permit NPDES permit application as required by EPA, then the authorization under the MS4-2003 permit or this permit to the small MS4 is automatically terminated at the end of the date specified by EPA as the deadline

## MA MS4 General Permit

for application submittal. EPA reserves the right to take enforcement action for any unpermitted discharge.

- b. A small MS4 may request to be excluded from this general permit by applying for an individual permit or authorization under an alternative general permit. In such a case, a small MS4 shall submit an individual permit application in accordance with the requirements of 40 CFR § 122.33(b) (2) (i) or § 122.33(b) (2) (ii), with reasons supporting the request, to EPA at the address listed in part 1.7.3 of this permit. The request may be granted by issuance of an individual permit or authorization under an alternative general permit if EPA determines that the reasons stated by the small MS4 are adequate to support the request. (See 40 CFR § 122.28(b) (3)).
- c. When an individual NPDES permit is issued, or a small MS4 is authorized to discharge under an alternative NPDES general permit, authorization under this permit automatically terminates on the effective date of the individual permit or the date of authorization of coverage under the alternative general permit.

### 1.9. Special Eligibility Determinations

#### 1.9.1. Documentation Regarding Endangered Species

The small MS4 shall certify eligibility regarding endangered species in the NOI required by part 1.7.2. The Stormwater Management Program (SWMP) shall include documentation supporting the permittee's eligibility determination with regard to federal Endangered and Threatened Species and Critical Habitat Protection, including:

- Results of the Appendix C U.S. Fish and Wildlife Service endangered species screening determination; and
- If applicable, a description of the measures the small MS4 shall implement to protect federally listed endangered or threatened species, or critical habitat, including any conditions imposed by the U.S. Fish and Wildlife Service. If a permittee fails to document and implement such measures, the permittee's discharges are ineligible for coverage under this permit.

#### 1.9.2. Documentation Regarding Historic Properties

The small MS4 shall certify eligibility regarding historic properties on the NOI required by part 1.7.2. The SWMP shall include documentation supporting the small MS4's eligibility determination with regard to Historic Properties Preservation, including:

- Information on whether the permittee's stormwater discharges, allowable non-stormwater discharges, or stormwater discharge-related activities would have an effect on a property that is listed or eligible for listing on the National Register of Historic Properties (NRHP);
- Where such effects may occur, any documents received by the permittee or any written agreements the permittee has made with the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (THPO), or other Tribal representative to mitigate those effects;
- Results of the Appendix D historic property screening investigations; and
- If applicable, a description of the measures the permittee shall implement 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 permittee fails to

document and implement such measures, those discharges are ineligible for coverage under this permit.

**1.10. Stormwater Management Program (SWMP)**

- a. The permittee shall develop and implement a written (hardcopy or electronic) SWMP. The SWMP shall be signed in accordance with Appendix B, Subsection 11, including the date of signature. A signature and date is required for initial program preparation and for any significant revision to the program, which shall be in writing. The written SWMP shall be completed within one (1) year of the effective date of the permit.

The SWMP is the document used by the permittee to describe and detail the activities and measures that will be implemented to meet the terms and conditions of the permit. The SWMP shall accurately describe 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.

- b. Permittees authorized by the MS4-2003 permit shall modify or update their existing Best Management Practices (BMPs) and measurable goals to meet the terms and conditions of part 2.3 of this permit within one (1) year of the effective date of the permit. These modifications and updates shall be reflected in the written (hardcopy or electronic) SWMP. Permittees authorized by the MS4-2003 permit shall continue to implement their existing SWMP until the program has been updated.

**1.10.1. Stormwater Management Program Availability**

- a. The permittee shall retain a copy of the current SWMP required by this permit at the office or facility of the person listed as the program contact on the submitted Notice of Intent (NOI). The SWMP shall be immediately available to representatives from EPA, MassDEP, U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) at the time of an onsite inspection or upon request.
- b. The permittee shall make the SWMP available to the public during normal business hours. The permittee shall also post the SWMP online<sup>1</sup> if the permittee has a website on which to post the SWMP.

**1.10.2. Contents and Timelines of the Stormwater Management Program for 2003 permittees**

The following information must be included in the SWMP within one (1) year of the permit effective date and updated annually thereafter, as necessary:

- Identification of names and titles of people responsible for program implementation. If a position is currently unfilled, list the title of the position and modify the SWMP with the name once the position is filled;
- Documentation of compliance with part 1.9.1;
- Documentation of compliance with part 1.9.2;

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<sup>1</sup> Should a permittee not wish to post mapping information included in the SWMP (see part 1.10.2) on their website for public safety reasons, they must state the reason either with or within the online SWMP and provide how the MS4 mapping information can be obtained. The permittee must retain the entire SWMP, including all completed mapping, at a location where it can be made available to the public during normal business hours.

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- Documentation of authorization of all new or increased discharges granted by MassDEP in compliance with part 2.1.2;
- Listing of all discharges identified pursuant to part 2.1.1 and description of response;
- Description of practices to achieve compliance with part 2.3 (MEP requirements) identified in the permittee's NOI and any updates to those BMPs within the first year;
  - For each permit condition in part 2.3 identify:
    - The person(s) or department responsible for the measure;
    - The BMPs for the control measure or permit requirement;
    - The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal shall have a measure of assessment associated with it;
- Sanitary Sewer Overflow (SSO) inventory including all of the information required in part 2.3.4.4.b;
- Written IDDE Program pursuant to part 2.3.4.6;
- Written procedures for site inspections and enforcement of sediment and erosion control procedures in accordance with part 2.3.5;
- Description of measures to avoid or minimize impacts to surface public drinking water supply sources. The permittee is also encouraged to include provisions to notify public water supplies in the event of an emergency. Massachusetts Department of Environmental Protection, Bureau of Resource Protection, Drinking Water Program, One Winter Street, Boston, MA 02108 – phone 617.292.5770.
- Description of activities to achieve compliance with part 3.0;
- Annual program evaluation (part 4.1). Update annually and maintain copies.

The following information must be included in the SWMP within two (2) years of the permit effective date and updated annually thereafter, as necessary:

- Listing of all receiving waterbody segments, their classification under the applicable state water quality standards, any impairment(s) and associated pollutant(s) of concern, applicable TMDLs and WLAs, and number of outfalls from the MS4 that discharge to each waterbody. In addition to the receiving water, the permittee shall document in the SWMP all surface public drinking water sources that may be impacted by MS4 discharges;
- Listing of all interconnected MS4s and other separate storm sewer systems receiving a discharge from the permitted MS4, the receiving waterbody segment(s) ultimately receiving the discharge, their classification under the applicable state water quality standards, any impairment(s) and associated pollutant(s) of concern, applicable TMDLs and WLAs, and the number of interconnections;
- Written procedures to require submission of as-built drawings and ensure long term operation and maintenance in accordance with part 2.3.6.a.iii;
- The map of the separate storm sewer system required by part 2.3.4.5.

The following information must be included in the SWMP within four (4) years of the permit effective date and updated annually thereafter, as necessary:

- Report(s) assessing current street design and parking lot guidelines and other local requirements within the municipality that affect the creation of impervious cover.

The following information must be included in the SWMP concurrent with the applicable

deadlines in Appendix F and H and updated annually thereafter, as necessary:

- Description of practices to achieve compliance with part 2.2.1 (TMDL requirements) including:
  - The person(s) or department responsible for the measure;
  - The BMPs for the control measure or permit requirement;
  - The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal must have an associated measure of assessment.
- Description of practices to achieve compliance with part 2.2.2 (discharges to certain water quality limited waters subject to additional requirements) including:
  - The person(s) or department responsible for the measure;
  - The BMPs for the control measure or permit requirement;
  - The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal must have an associated measure of assessment;
- Description of any other practices to achieve compliance with part 2.1 (water quality based requirements)

### **1.10.3. Contents and Timelines of the Stormwater Management Program for New Permittees**

a. Permittees seeking authorization for the first time shall meet all deadlines contained in this permit except the following:

- Timelines for public education requirements in part 2.3.2.c shall be extended by one (1) year and need to include one (1) message to each audience over the permit term;
- The ordinances, by-laws, or other regulatory mechanisms required by parts 2.3.4, 2.3.5 and 2.3.6 shall be completed as soon as possible, but no later than three (3) years from the permit effective date; and
- All other deadlines in part 2.3.4 shall be extended by three (3) years.
- All other deadlines in part 2.3.5, 2.3.6 and 2.3.7 shall be extended by two (2) years.
- All deadlines for discharges to water quality limited waters without a TMDL under part 2.2.2 shall be extended by two (2) years.

b. Contents of the Stormwater Management Program for New Permittees

The following information must be included in the SWMP within one (1) year of the permit effective date and updated annually thereafter, as necessary:

- Identification of names and titles of people responsible for program implementation. If a position is currently unfilled, list the title of the position and modify the SWMP with the name once the position is filled;
- Documentation of compliance with part 1.9.1;
- Documentation of compliance with part 1.9.2;
- Documentation of authorization of all new or increased discharges granted by MassDEP in compliance with part 2.1.2;
- Listing of all discharges identified pursuant to part 2.1.1 and description of response;
- Description of practices to achieve compliance with part 2.3 (MEP requirements) identified in the permittee's NOI and any updates to those BMPs within the first year;

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For each permit condition in part 2.3 identify:

- The person(s) or department responsible for the measure;
  - The BMPs for the control measure or permit requirement;
  - The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal shall have a measure of assessment associated with it;
- Description of measures to avoid or minimize impacts to surface public drinking water supply sources. The permittee is also encouraged to include provisions to notify public water supplies in the event of an emergency. Massachusetts Department of Environmental Protection, Bureau of Resource Protection, Drinking Water Program, One Winter Street, Boston, MA 02108 – phone 617.292.5770. Description of activities to achieve compliance with part 3.0;
  - Annual program evaluation (part 4.1). Update annually and maintain copies.

The following information must be included in the SWMP within three (3) years of the permit effective date and updated annually thereafter, as necessary:

- Written procedures for site inspections and enforcement of sediment and erosion control procedures in accordance with part 2.3.5;

The following information must be included in the SWMP within four (4) years of the permit effective date and updated annually thereafter, as necessary:

- Outfall and interconnection inventory;
- Sanitary Sewer Overflow (SSO) inventory including all of the information required in part 2.3.4.4.b;
- Written IDDE Program pursuant to part 2.3.4.6.
- Written operation and maintenance procedures for municipal activities in part 2.3.7.a.ii;
- Written program detailing the activities and procedures the permittee will implement so that the MS4 infrastructure is maintained in a timely manner to reduce the discharge of pollutants from the MS4 in accordance with part 2.3.7.a.iii.1;
- Written procedures to require submission of as-built drawings and ensure long term operation and maintenance in accordance with part 2.3.6.a.iii;

The following information must be included in the SWMP within five (5) years of the permit effective date and updated annually thereafter, as necessary:

- Phase 1 of the map of the separate storm sewer system required by part 2.3.4.5;
- Listing of all receiving waterbody segments, their classification under the applicable state water quality standards, any impairment(s) and associated pollutant(s) of concern, applicable TMDLs and WLAs, and number of outfalls from the MS4 that discharge to each waterbody. In addition to the receiving water, the permittee shall document in the SWMP all surface public drinking water sources that may be impacted by MS4 discharges;
- Listing of all interconnected MS4s and other separate storm sewer systems receiving a discharge from the permitted MS4, the receiving waterbody segment(s) ultimately receiving the discharge, their classification under the applicable state water quality standards, any impairment(s) and associated pollutant(s) of concern, applicable TMDLs and WLAs, and the number of interconnections;

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The following information must be included in the SWMP within six (6) years of the permit effective date and updated annually thereafter, as necessary:

- Report(s) assessing current street design and parking lot guidelines and other local requirements within the municipality that affect the creation of impervious cover.

The following information must be included in the SWMP concurrent with the applicable deadlines in Appendix F and H (extended by two (2) years) and updated annually thereafter, as necessary:

- Description of practices to achieve compliance with part 2.2.1 (discharges subject to requirements related to approved TMDLs) including:
  - The person(s) or department responsible for the measure;
  - The BMPs for the control measure or permit requirement;
  - The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal must have an associated measure of assessment.
- Description of practices to achieve compliance with part 2.2.2 (discharges to certain water quality limited waters subject to additional requirements) including:
  - The person(s) or department responsible for the measure;
  - The BMPs for the control measure or permit requirement;
  - The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal must have an associated measure of assessment;
- Description of any other practices to achieve compliance with part 2.1 (water quality based requirements).

### **2.0. Non-Numeric Effluent Limitations**

The permittee shall develop, implement, and enforce a program to reduce the discharge of pollutants from the MS4 to the maximum extent practicable; to protect water quality and to satisfy the appropriate water quality requirements of the Clean Water Act and the Massachusetts Water Quality Standards.

#### **2.1. Water Quality Based Effluent Limitations**

Pursuant to Clean Water Act 402(p)(3)(B)(iii), this permit includes provisions to ensure that discharges from the permittee's small MS4 do not cause or contribute to an exceedance of water quality standards, in addition to requirements to reduce the discharge of pollutants to the maximum extent practicable. The requirements found in this part and part 2.2 constitute appropriate water quality based effluent limits of this permit. Requirements to reduce the discharge of pollutants to the maximum extent practicable are set forth in part 2.3.

##### **2.1.1. Requirement to Meet Water Quality Standards**

- a. The permittee shall reduce the discharge of pollutants such that the discharges from the MS4 do not cause or contribute to an exceedance of water quality standards.

- b. If there is a discharge from the MS4 to a waterbody (or its tributaries in some cases) that is subject to an approved TMDL identified in part 2.2.1, the permittee is subject to the requirements of part 2.2.1 and Appendix F of this permit and the permittee shall comply with all applicable schedules and requirements in Appendix F. A permittee's compliance with all applicable requirements and BMP implementation schedules in Appendix F applicable to it will constitute compliance with part 2.1.1.a. of the Permit.
- c. If there is a discharge from the MS4 to a waterbody (or its tributaries in some cases) that is water quality limited (see definition in Appendix A) due to nutrients (Total Nitrogen or Total Phosphorus), metals (Cadmium, Copper, Iron, Lead or Zinc), solids (TSS or Turbidity), bacteria/pathogens (E. Coli, Enterococcus or Fecal Coliform), chloride (Chloride) or oil and grease (Petroleum Hydrocarbons or Oil and Grease) and is not subject to an approved TMDL, or the MS4 is located within a municipality listed in part 2.2.2.a.-b., the permittee is subject to the requirements of part 2.2.2 and Appendix H of this permit and the permittee shall comply with all applicable schedules and requirements in Appendix H. A permittee's compliance with all applicable requirements and BMP implementation schedules in Appendix H applicable to it will constitute compliance with part 2.1.1.a. of the Permit.
- d. Except where a pollutant of concern in a discharge is subject to the requirements of part 2.2.1 and/or part 2.2.2 of this permit or is the result of an illicit discharge and subject to part 2.3.4 of this Permit, if a pollutant in a discharge from the MS4 is causing or contributing to a violation of applicable water quality criteria<sup>2</sup> for the receiving water, the permittee shall, as expeditiously as possible, but no later than 60 days of becoming aware of the situation, reduce or eliminate the pollutant in its discharge such that the discharge meets applicable water quality criteria.

### 2.1.2. Increased Discharges

- a. Any increased discharge, including increased pollutant loading(s) through the MS4 to waters of the United States is subject to Massachusetts antidegradation regulations at 314 CMR 4.04. The permittee shall comply with the provisions of 314 CMR 4.04 including information submittal requirements and obtaining authorization for increased discharges where appropriate<sup>3</sup>. Any authorization of an increased discharge by MassDEP shall be incorporated into the permittee's SWMP. If an applicable MassDEP approval specifies additional conditions or requirements, then those requirements are incorporated into this permit by reference. The permittee must comply with all such requirements.
- b. There shall be no increased discharges, including increased pollutant loading(s) from the MS4 to impaired waters listed in categories 5 or 4b on the most recent Massachusetts Integrated Report of waters listed pursuant to Clean Water Act section 303(d) and 305(b) unless the permittee demonstrates that there is no net increase in loading from the MS4 to the impaired water of the pollutant(s) for which the waterbody is impaired. The permittee may demonstrate compliance with this provision by *either*:
  - i. Documenting that the pollutant(s) for which the waterbody is impaired is not present in the MS4's discharge and retaining documentation of this finding with the SWMP; or

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<sup>2</sup> Applicable water quality criteria are part of the state standards that have been federally approved as of the effective date of this permit and are compiled by EPA at <http://www.epa.gov/waterscience/standards/wqslibrary/>

<sup>3</sup> Contact MassDEP for guidance on compliance with 314 CMR 4.04

- ii. Documenting that the total load of the pollutant(s) of concern from the MS4 to any impaired portion of the receiving water will not increase as a result of the activity and retaining documentation of this finding in the SWMP. Unless otherwise determined by the Permittee, USEPA or by MassDEP that additional demonstration is necessary, compliance with the requirements of part 2.2.2 and part 2.3.6 of this Permit, including all reporting and documentation requirements, shall be considered as demonstrating no net increase as required by this part.
- c. The requirements of this part are independent of permit conditions requiring reduction in discharges of pollutants as set forth in parts 2.1.1 and 2.2 (water quality based requirements) and 2.3 (requirements to reduce discharge of pollutants to the maximum extent practicable). Permittees remain subject to requirements to reduce the discharge of pollutants from the MS4 as set forth in those parts.

**2.2. Discharges to Certain Impaired Waters**

The permittee shall identify in the SWMP and Annual Reports all MS4 discharges, including both outfalls and interconnections to other MS4s or other separate storm sewer systems, that:

- Are subject to Total Maximum Daily Load (TMDL) related requirements as identified in part 2.2.1.
- Are subject to additional requirements to protect water quality as identified in part 2.2.2.

The discharge location from an interconnection shall be determined based on the receiving water of the outfall from the interconnected system.

**2.2.1. Discharges Subject to Requirements Related to an Approved TMDL**

- a. “Approved TMDLs” are those that have been approved by EPA as of the date of issuance of this permit.
- b. The MS4s specified below discharge to waters within Massachusetts that are subject to TMDLs, or in some cases, to tributaries of such waters, and shall comply with the requirements of Appendix F, part A. Appendix F identifies, by section, the provisions the permittee shall implement to be consistent with the terms of the approved TMDL. Alternatively, EPA may notify the permittee that an individual permit application is necessary in accordance with part 1.8.a.
  - i. The following is a list of municipalities in the Charles River Watershed:

1.

Arlington	Mendon
Ashland	Milford
Bellingham	Millis
Belmont	Natick
Brookline	Needham
Cambridge	Newton
Dedham	Norfolk

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Dover	Sherborn
Foxborough	Walpole
Franklin	Waltham
Holliston	Watertown
Hopedale	Wayland
Hopkinton	Wellesley
Lexington	Weston
Lincoln	Westwood
Medfield	Wrentham
Medway	

Permittees that operate regulated MS4s located in municipalities listed above that discharge to the Charles River or its Tributaries shall meet the requirements of Appendix F, part A.I with respect to the reduction of phosphorus discharges from their MS4.

- ii. The following is a list of municipalities that contain a lake or pond subject to an approved lake or pond phosphorus TMDL in the Northern Blackstone Basin, Chicopee Basin, Connecticut Basin, French Basin, Millers Basin or in the watershed of Bare Hill Pond, Flint Pond, Indian Lake, Lake Boon, Lake Quinsigamond, Leesville Pond, Salisbury Pond, Quaboag Pond or Quacumquasit Pond.

1.

Auburn	Millbury
Charlton	Oxford
Dudley	Shrewsbury
Gardner	Spencer
Grafton	Springfield
Granby	Stow
Hadley	Templeton
Harvard	Westminster
Hudson	Winchendon
Leicester	Wilbraham
Ludlow	

Permittees that operate regulated MS4s in the above municipalities that discharge to waterbodies listed on Table F-6 in Appendix F or their tributaries, and any other MS4 that discharges to waterbodies listed on Table F-6 in Appendix F or their tributaries, shall meet the requirements of Appendix F, part A.II with respect to reduction of phosphorus discharges from their MS4.

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iii. The following is a list of municipalities that contain waters subject to an approved TMDL for bacteria or pathogens.

1.

Abington	Marshfield
Acushnet	Mashpee
Andover	Mattapoissett
Avon	Medfield
Barnstable	Medway
Bedford	Melrose
Bellingham	Mendon
Belmont	Milford
Berkley	Millis
Beverly	Milton
Billerica	Nahant
Bourne	Natick
Brewster	Needham
Bridgewater	New Bedford
Brockton	Newton
Brookline	Norfolk
Burlington	North Andover
Cambridge	Norton
Canton	Norwell
Chatham	Norwood
Cohasset	Orleans
Concord	Peabody
Danvers	Pembroke
Dartmouth	Plymouth
Dedham	Raynham
Dennis	Rehoboth
Dighton	Revere
Dover	Rockland
Duxbury	Rockport
East Bridgewater	Salem
Eastham	Sandwich
Essex	Saugus
Everett	Scituate
Fairhaven	Seekonk
Fall River	Sharon
Falmouth	Sherborn
Foxborough	Somerset
Franklin	Stoughton

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Freetown	Swampscott
Gloucester	Swansea
Hanover	Taunton
Hanson	Tewksbury
Harwich	Wakefield
Holliston	Walpole
Hopedale	Waltham
Hopkinton	Wareham
Ipswich	Watertown
Kingston	Wellesley
Lawrence	Wellfleet
Lexington	West Bridgewater
Lincoln	Weston
Lynn	Westport
Lynnfield	Westwood
Malden	Whitman
Manchester	Wilmington
Mansfield	Winthrop
Marblehead	Yarmouth
Marion	

The operators of MS4s located in municipalities listed above that discharge to a waterbody segment listed on Table F-8 in Appendix F and any other MS4 that discharges directly to a waterbody segment listed on Table F-8 in Appendix F shall meet the requirements of Appendix F, part A.III with respect to reduction of bacteria/pathogens discharges from their MS4.

- iv. The following is a list of municipalities located on Cape Cod that contain waters subject to an approved TMDL for nitrogen (Total Nitrogen).

1.

Bourne
Barnstable
Chatham
Falmouth
Harwich
Mashpee
Orleans
Yarmouth

Permittees that operate regulated MS4s located in the municipalities above that discharge to waterbodies found on Table F-9 in Appendix F or their tributaries and any other MS4 that discharges to waterbodies found on Table F-9 in Appendix F or their

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tributaries shall meet the requirements of Appendix F, part A.IV with respect to reduction of nitrogen discharges from their MS4.

v. The following is a list of municipalities located in the Assabet River Watershed:

1.

Acton	Hudson
Berlin	Littleton
Bolton	Marlborough
Boxborough	Maynard
Boylston	Northborough
Carlisle	Shrewsbury
Clinton	Stow
Concord	Westborough
Grafton	Westford
Harvard	

Permittees that operate regulated MS4s located in the municipalities above that discharge to the Assabet River or its tributaries shall meet the requirements of Appendix F part A.V with respect to reduction of phosphorus discharges from their MS4.

c. The MS4s specified below discharge to waters, or tributaries of waters, that have been identified in an adjacent state’s approved TMDL as being impaired due, in part, to MS4 stormwater discharges in Massachusetts, and shall comply with the requirements of Appendix F, part B. Appendix F identifies, by section, the provisions the permittee shall implement to be consistent with the reasonable assumptions related to Massachusetts MS4 discharges. Alternatively, EPA may notify the permittee that an individual permit application is necessary in accordance with part 1.8.a.

i. The following is a list of municipalities in Massachusetts located in the watershed of Long Island Sound, which has an approved TMDL for nitrogen (Total Nitrogen).

1.

Adams	North Adams
Agawam	Northampton
Amherst	Oxford
Ashburnham	Palmer
Ashby	Paxton
Auburn	Pelham
Belchertown	Pittsfield
Charlton	Richmond
Cheshire	Russell
Chicopee	Rutland
Dalton	South Hadley
Douglas	Southampton

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Dudley	Southbridge
East Longmeadow	Southwick
Easthampton	Spencer
Gardner	Springfield
Granby	Sturbridge
Hadley	Sutton
Hampden	Templeton
Hatfield	Ware
Hinsdale	Webster
Holyoke	West Springfield
Lanesborough	Westfield
Leicester	Westhampton
Lenox	Westminster
Longmeadow	Wilbraham
Ludlow	Williamsburg
Millbury	Winchendon
Monson	

Permittees that operate regulated MS4s located in the municipalities above that discharge to a water within the Connecticut River Watershed, the Housatonic River Watershed, or the Thames River Watershed shall meet the requirements of Appendix F part B. I with respect to nitrogen discharges from their MS4.

- ii. The following is a list of municipalities in Massachusetts identified in a TMDL as containing MS4s contributing phosphorus to waterbody segments that have out of state approved TMDLs for phosphorus:

- 1.

Attleboro
North Attleborough
Plainville
Rehoboth
Seekonk
Swansea

Permittees that operate regulated MS4s located in the municipalities above that discharge to a waterbody found on Table F-12 in Appendix F or its tributaries shall meet the requirements of Appendix F part B. II with respect to phosphorus discharges from their MS4.

- iii. The following is a list of municipalities in Massachusetts identified in a TMDL as containing MS4s contributing bacteria/pathogens to waterbody segments that have out of state approved TMDLs for bacteria/pathogens:

- 1.

Attleboro
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North Attleborough
Plainville
Rehoboth
Seekonk

Permittees that operate regulated MS4s located in the municipalities above that discharge to a waterbody found on Table F-13 in Appendix F or its tributaries shall meet the requirements of Appendix F part B. III with respect to bacteria/pathogens discharges from their MS4.

- iv. The following is a list of municipalities in Massachusetts identified in a TMDL as containing MS4s contributing metals (cadmium, lead, aluminum iron) to waterbody segments that have out of state approved TMDLs for metals (cadmium, lead, aluminum, iron):

1.

Attleboro
North Attleborough
Plainville
Seekonk

Permittees that operate regulated MS4s located in the municipalities above that discharge to a waterbody found on Table F-14 in Appendix F or its tributaries shall meet the requirements of Appendix F part B. IV with respect to metals discharges from their MS4.

**2.2.2. Discharges to Certain Water Quality Limited Waters Subject to Additional Requirements**

For purposes of this permit, a ‘water quality limited water body’ is any water body that does not meet applicable water quality standards, including but not limited to waters listed in categories 5 or 4b on the Massachusetts Integrated Report of waters listed pursuant to Clean Water Act section 303(d) and 305(b).

If there is a discharge from the MS4 to a water quality limited waterbody where pollutants typically found in stormwater (specifically nutrients (Total Nitrogen or Total Phosphorus), solids (TSS or Turbidity), bacteria/pathogens (E. Coli, Enterococcus or Fecal Coliform), chloride (Chloride), metals (Cadmium, Copper, Iron, Lead or Zinc) and oil and grease (Petroleum Hydrocarbons or Oil and Grease)) are the cause of the impairment and there is not an approved TMDL, or the MS4 is located in a town listed in part 2.2.2.a.-b, the permittee shall comply with the provisions in Appendix H applicable to it.

In the absence of a defined pollutant reduction target and where no approved TMDL has been established, this permit part and Appendix H define an iterative approach addressing pollutant reductions to waterbodies where the permittee’s discharge is causing or contributing to an excursion above water quality standards due to nutrients (Total Nitrogen Total Phosphorus), solids (TSS or Turbidity), bacteria/pathogens (E. Coli, Enterococcus or Fecal Coliform), chloride (Chloride), metals (Cadmium, Copper, Iron, Lead or Zinc) or oil and grease (Petroleum Hydrocarbons or Oil and Grease).

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a. Discharges to water quality limited waterbodies where nitrogen (Total Nitrogen) is the cause of the impairment, or their tributaries

i. The requirements of this part are applicable to:

1. Permittees (including traditional and non-traditional MS4s) that own or operate an MS4 in the following municipalities. Discharges from MS4s within these municipalities are to waterbodies that are impaired due to nitrogen (Total Nitrogen), or their tributaries.

Abington	Mattapoisett
Acushnet	Middleborough
Attleboro	New Bedford
Avon	Norton
Barnstable	Peabody
Berkley	Pembroke
Bourne	Plainville
Bridgewater	Plymouth
Brockton	Plympton
Carver	Raynham
Dartmouth	Rehoboth
Dighton	Rochester
East Bridgewater	Salem
Easton	Seekonk
Fairhaven	Sharon
Fall River	Somerset
Foxborough	Stoughton
Freetown	Swansea
Halifax	Taunton
Hanson	Wakefield
Holbrook	Wareham
Kingston	West Bridgewater
Lakeville	Westport
Lynnfield	Whitman
Mansfield	Wrentham
Marion	Yarmouth

2. Any other permittee that, during the permit term, becomes aware that its discharge is to a waterbody that is water quality limited due to nitrogen (Total Nitrogen), or a tributary of such water.

ii. Permittees subject to part 2.2.2.a.i above shall meet the requirements of Appendix H part I with respect to the control of nitrogen discharges from their MS4;

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- iii. During development of their Notice of Intent, the permittee may determine that all discharges from the regulated area through their MS4 are outside of a watershed that contains a nitrogen (Total Nitrogen) impairment in a downstream segment. The permittee shall retain all documentation used in this determination as part of their NOI and are relieved from the requirements of part 2.2.2.a.i and Appendix H part I.
- b. Discharges to water quality limited waterbodies where phosphorus (“Total Phosphorus”) is the cause of the impairment, or their tributaries
- i. The requirements of this part are applicable to:
    - 1. Permittees (including traditional and non-traditional MS4s) that own or operate an MS4 in the following municipalities. Discharges from MS4s within these municipalities are to waterbodies that are impaired due to phosphorus (Total Phosphorus), or their tributaries.

Abington	Lynn
Acushnet	Lynnfield
Andover	Malden
Arlington	Mansfield
Ashburnham	Marlborough
Ashland	Mashpee
Auburn	Medfield
Avon	Medford
Ayer	Melrose
Barnstable	Mendon
Bedford	Methuen
Belchertown	Millbury
Belmont	Millville
Billerica	Milton
Blackstone	North Andover
Bolton	Northbridge
Brewster	Norton
Bridgewater	Norwood
Brockton	Oxford
Burlington	Peabody
Cambridge	Pembroke
Canton	Pepperell
Carlisle	Pittsfield
Carver	Quincy
Chelmsford	Randolph
Chelsea	Reading

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Clinton	Revere
Concord	Rockland
Dalton	Salem
Dedham	Scituate
Douglas	Seekonk
Dover	Sharon
Dracut	Shirley
Dunstable	Shrewsbury
East Bridgewater	Somerville
Eastham	Southampton
Easthampton	Spencer
Everett	Springfield
Falmouth	Stoneham
Fitchburg	Stoughton
Foxborough	Sudbury
Framingham	Sutton
Gloucester	Taunton
Grafton	Tewksbury
Granby	Townsend
Groton	Tyngsborough
Halifax	Upton
Hanover	Uxbridge
Hanson	Wakefield
Harvard	Walpole
Haverhill	Wareham
Hinsdale	Watertown
Hopkinton	Wayland
Hudson	West Bridgewater
Lancaster	Westfield
Lawrence	Westminster
Leicester	Westwood
Lenox	Whitman
Leominster	Wilmington
Lexington	Winchendon
Littleton	Winchester
Lowell	Winthrop
Lunenburg	Woburn
Lynn	

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2. Any other permittee that, during the permit term, becomes aware that its discharge is to a waterbody that is water quality limited due to phosphorus (“Total Phosphorus”), or to a tributary of such water.
- ii. The permittees subject to part 2.2.2.b.i. above shall meet all requirements of Appendix H part II with respect to the control of phosphorus discharges from the MS4.
  - iii. During development of their Notice of Intent, the permittee may determine that all discharges from the regulated area through their MS4 are outside of a watershed that contains a phosphorus (“Total Phosphorus”) impairment in a downstream segment. The permittee shall retain all documentation used in this determination as part of their NOI and are relieved from the requirements of part 2.2.2.b.i and Appendix H part II.
- c. Discharges to water quality limited waterbodies where bacteria or pathogens is the cause of the impairment
- i. The requirements of this part are applicable to:
    1. Any MS4 discharge identified by the permittee on their Notice of Intent as discharging directly to an impaired waterbody on the most recent EPA approved Massachusetts 303(d) list where bacteria or pathogens (E. Coli, Enterococcus or Fecal Coliform) is the cause of the impairment.
    2. Any other MS4 that, during the permit term, becomes aware that its discharge is to a waterbody that is water quality limited due to bacteria or pathogens.
  - ii. The permittees subject to part 2.2.2.c.i. shall meet all requirements of Appendix H part III with respect to reduction of bacteria or pathogens discharges from the MS4.
- d. Discharges to water quality limited waterbodies where chloride (Chloride) is the cause of the impairment
- i. The requirements of this part are applicable to:
    1. Any MS4 discharge identified by the permittee on their Notice of Intent as discharging directly to an impaired waterbody on the most recent EPA approved Massachusetts 303(d) list where chloride (Chloride) is the cause of the impairment.
    2. Any other MS4 that, during the permit term, becomes aware that its discharge is to a waterbody that is water quality limited due to chloride (Chloride).
  - ii. The permittees subject to part 2.2.2.d.i. shall meet all requirements of Appendix H part IV with respect to reduction of chloride discharges from the MS4.
- e. Discharges to water quality limited waterbodies where oil and grease (Petroleum Hydrocarbons or Oil and Grease), solids (TSS or Turbidity) or metals (Cadmium, Copper, Iron, Lead or Zinc) is the cause of the impairment
- i. The requirements of this part are applicable to:
    1. Any MS4 discharge identified by the permittee on their Notice of Intent as discharging directly to an impaired waterbody on the most recent EPA

approved Massachusetts 303(d) list where oil and grease, solids or metals (Oil and Grease, Petroleum Hydrocarbons TSS, Turbidity, Cadmium, Copper, Iron, Lead or Zinc) is the cause of the impairment.

2. Any other MS4 that, during the permit term, becomes aware that its discharge is to a waterbody that is water quality limited due to oil and grease (Petroleum Hydrocarbons or Oil and Grease), solids (TSS or Turbidity) or metals (Cadmium, Copper, Iron, Lead or Zinc).

ii. The permittees subject to part 2.2.2.d.i. shall meet all requirements of Appendix H part V with respect to reduction of solids, oil and grease or metals discharges from the MS4.

### **2.3. Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP)**

The permittee shall reduce the discharge of pollutants from the MS4 to the maximum extent practicable (MEP) as detailed in parts 2.3.2 through 2.3.7.

#### **2.3.1. Control Measures**

- a. Permittees authorized under the MS4-2003 permit shall continue to implement their existing SWMPs while updating their SWMPs pursuant to this permit. This permit does not extend the compliance deadlines set forth in the MS4-2003 permit.
- b. Implementation of one or more of the minimum control measures described in parts 2.3.2- 2.3.7 or other permit requirements may be shared with another entity (including another interconnected MS4) or the other entity may fully implement the measure or requirement, if the following requirements are satisfied:
  - The other entity, in fact, implements the control measure.
  - The particular control measure or component thereof undertaken by the other entity is at least as stringent as the corresponding permit requirement.
  - The other entity agrees to implement the control measure on the permittee's behalf. The annual reports must specify that the permittee is relying on another entity to satisfy some of its permit obligations and specify what those obligations are.
  - If the permittee is relying on another governmental entity regulated under 40 CFR §122 to satisfy all of its permit obligations, including the obligation to file annual reports, the permittee shall note that fact in its NOI, but is not required to file annual reports.
  - The permittee remains responsible for compliance with all permit obligations if the other entity fails to implement the control measures (or component thereof). The permittee may enter into a legally binding agreement with the other entity regarding the other entity's performance of control measures, but the permittee remains ultimately responsible for permit compliance.

#### **2.3.2. Public Education and Outreach**

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 pollutants in stormwater are reduced.

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- a. The permittee shall continue to implement the public education program required by the MS4-2003 permit by distributing educational material to the MS4 community. The educational program shall define educational goals, express specific messages, define the targeted audience for each message, and identify responsible parties for program implementation. If appropriate for the target audience, materials may be developed in a language other than English. At a minimum, the program shall provide information concerning the impact of stormwater discharges on water bodies within the community, especially those waters that are impaired or identified as priority waters. The program shall identify steps and/or activities that the public can take to reduce the pollutants in stormwater runoff and their impacts to the environment.
- b. The educational program shall include education and outreach efforts for the following four audiences: (1) residents, (2) businesses, institutions (churches, hospitals), and commercial facilities, (3) developers (construction), and (4) industrial facilities, unless one of these audiences is not present in the MS4 community. In such a situation, the MS4 must document in both the NOI and SWMP which audience is absent from the community and no educational messages are required to that audience.
- c. The permittee shall distribute a minimum of two (2) educational messages over the permit term to each audience identified in part 2.3.2.b. The distribution of materials to each audience shall be spaced at least a year apart. Educational messages may be printed materials such as brochures or newsletters; electronic materials such as websites; mass media such as newspaper articles or public service announcement (radio or cable); targeted workshops on stormwater management, or displays in a public area such as town/city hall. The permittee may use existing materials if they are appropriate for the message the permittee chooses to deliver or the permittee may develop its own educational materials. The permittee may partner with other MS4s, community groups or watershed associations to implement the education program to meet this permit requirement.

Some EPA educational materials are available at: <http://cfpub.epa.gov/npstbx/index.html>.

- d. The permittee shall, at a minimum, consider the topics listed in part 2.3.2.d.i. – iv when developing the outreach/education program. The topics are not exclusive and the permittee shall focus on those topics most relevant to the community.
  - i. Residential program: effects of outdoor activities such as lawn care (use of pesticides, herbicides, and fertilizers and information on Massachusetts Regulation 331 CMR 31 pertaining to proper use of phosphorus containing fertilizers on turf grasses) on water quality; benefits of appropriate on-site infiltration of stormwater; effects of automotive work and car washing on water quality; proper disposal of swimming pool water; proper management of pet waste; maintenance of septic systems. If the small MS4 area has areas serviced by septic systems, the permittee shall consider information pertaining to maintenance of septic systems as part of its education program.
  - ii. Business/Commercial/Institution program: proper lawn maintenance (use of pesticides, herbicides and fertilizer, and information on Massachusetts Regulation 331 CMR 31 pertaining to proper use of phosphorus containing fertilizers on turf grasses); benefits of appropriate on-site infiltration of stormwater; building maintenance (use of detergents); use of salt or other de-icing and anti-icing materials (minimize their use); proper storage of salt or other de-icing/anti-icing materials (cover/prevent runoff to storm system and contamination to ground water); proper storage of materials (emphasize pollution prevention); proper management of waste materials and dumpsters (cover and pollution

prevention); proper management of parking lot surfaces (sweeping); proper car care activities (washing of vehicles and maintenance); and proper disposal of swimming pool water by entities such as motels, hotels, and health and country clubs (discharges must be dechlorinated and otherwise free from pollutants).

- iii. Developers and Construction: proper sediment and erosion control management practices; information about Low Impact Development (LID) principles and technologies; and information about EPA's construction general permit (CGP). This education can also be a part of the Construction Site Stormwater Runoff Control measure detailed in part 2.3.5.
  - iv. Industrial program: equipment inspection and maintenance; proper storage of industrial materials (emphasize pollution prevention); proper management and disposal of wastes; proper management of dumpsters; minimization of use of salt or other de-icing/anti-icing materials; proper storage of salt or other de-icing/anti-icing materials (cover/prevent runoff to storm system and ground water contamination); benefits of appropriate on-site infiltration of stormwater runoff from areas with low exposure to industrial materials such as roofs or employee parking; proper maintenance of parking lot surfaces (sweeping); and requirements for coverage under EPA's Multi-Sector General Permit.
- e. The program shall show evidence of focused messages for specific audiences as well as evidence that progress toward the defined educational goals of the program has been achieved. The permittee shall identify methods that it will use to evaluate the effectiveness of the educational messages and the overall education program. Any methods used to evaluate the effectiveness of the program shall be tied to the defined goals of the program and the overall objective of changes in behavior and knowledge.
  - f. The permittee shall modify any ineffective messages or distribution techniques for an audience prior to the next scheduled message delivery.
  - g. The permittee shall document in each annual report the messages for each audience; the method of distribution; the measures/methods used to assess the effectiveness of the messages, and the method/measures used to assess the overall effectiveness of the education program.

### **2.3.3. Public Involvement and Participation**

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

- a. All public involvement activities shall comply with state public notice requirements (MGL Chapter 30A, Sections 18 – 25 – effective 7/10/2010). The SWMP and all annual reports shall be available to the public.
- b. The permittee shall annually provide the public an opportunity to participate in the review and implementation of the SWMP.
- c. The permittee shall report on the activities undertaken to provide public participation opportunities including compliance with part 2.3.3.a. Public participation opportunities pursuant

to part 2.3.3.b may include, but are not limited to, websites; hotlines; clean-up teams; monitoring teams; or an advisory committee.

#### **2.3.4. Illicit Discharge Detection and Elimination (IDDE) Program**

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

- a. Legal Authority - The IDDE program shall include adequate legal authority to: prohibit illicit discharges; investigate suspected illicit discharges; eliminate illicit discharges, including discharges from properties not owned by or controlled by the MS4 that discharge into the MS4 system; and implement appropriate enforcement procedures and actions. Adequate legal authority consists of a currently effective ordinance, by-law, or other regulatory mechanism. For permittees authorized by the MS4-2003 permit, the ordinance, by-law, or other regulatory mechanism was a requirement of the MS4-2003 permit and was required to be effective by May 1, 2008. For new permittees the ordinance, by-law, or other regulatory mechanism shall be in place within 3 years of the permit effective date.
- b. During the development of the new components of the IDDE program required by this permit, permittees authorized by the MS4-2003 permit must continue to implement their existing IDDE program required by the MS4-2003 permit to detect and eliminate illicit discharges to their MS4.

##### **2.3.4.1. Definitions and Prohibitions**

The permittee shall prohibit illicit discharges and sanitary sewer overflows (SSOs) to its MS4 and require removal of such discharges consistent with parts 2.3.4.2 and 2.3.4.4 of this permit.

An SSO is a discharge of untreated sanitary wastewater from a municipal sanitary sewer.

An illicit discharge is any discharge to a municipal separate storm sewer that is not composed entirely of stormwater, except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.

##### **2.3.4.2. Elimination of Illicit Discharges**

- a. Upon detection of an illicit discharge, the permittee shall locate, identify and eliminate the illicit discharge as expeditiously as possible. Upon identification of the illicit source the MS4 notify all responsible parties for any such discharge and require immediate cessation of improper disposal practices in accordance with its legal authorities. Where elimination of an illicit discharge within 60 days of its identification as an illicit discharge is not possible, the permittee shall establish an expeditious schedule for its elimination and report the dates of identification and schedules for removal in the permittee's annual reports. The permittee shall immediately commence actions necessary for elimination. The permittee shall diligently pursue elimination of all illicit discharges. In the interim, the permittee shall take all reasonable and prudent measures to minimize the discharge of pollutants to and from its MS4.
- b. The period between identification and elimination of an illicit discharge is not a grace period. Discharges from an MS4 that are mixed with an illicit discharge are not authorized by this Permit (part 1.3.a) and remain unlawful until eliminated.

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### 2.3.4.3. Non-Stormwater Discharges

The permittee may presume that the sources of non-stormwater listed in part 1.4 of this permit need not be addressed. However, if the permittee identifies any of these sources as significant contributors of pollutants to the MS4, then the permittee shall implement measures to control these sources so they are no longer significant contributors of pollutants, and/or eliminate them entirely, consistent with part 2.3.4.

### 2.3.4.4. Sanitary Sewer Overflows

- a. Upon detection of an SSO the permittee shall eliminate it as expeditiously as possible and take interim mitigation measures to minimize the discharge of pollutants to and from its MS4 until elimination is completed.
- b. The permittee shall identify all known locations where SSOs have discharged to the MS4 within the previous five (5) years. This shall include SSOs resulting, during dry or wet weather, from inadequate conveyance capacities, or where interconnectivity of the storm and sanitary sewer infrastructure allows for communication of flow between the systems. Within one (1) year of the effective date of the permit, the permittee shall develop an inventory of all identified SSOs indicating the following information, if available:
  1. Location (approximate street crossing/address and receiving water, if any);
  2. A clear statement of whether the discharge entered a surface water directly or entered the MS4;
  3. Date(s) and time(s) of each known SSO occurrence (i.e., beginning and end of any known discharge);
  4. Estimated volume(s) of the occurrence;
  5. Description of the occurrence indicating known or suspected cause(s);
  6. Mitigation and corrective measures completed with dates implemented; and
  7. Mitigation and corrective measures planned with implementation schedules.

The permittee shall maintain the inventory as a part of the SWMP and update the inventory annually, all updates shall include the information in part 2.3.4.4.b.1-7.

- c. In accordance with Paragraph B.12 of Appendix B of this permit, upon becoming aware of an SSO to the MS4, the permittee shall provide oral notice to EPA within 24 hours. Additionally, the permittee shall provide written notice to EPA and MassDEP within five (5) days of becoming aware of the SSO occurrence and shall include the information in the updated inventory. The notice shall contain all of the information listed in part 2.3.4.4.b. Where common notification requirements for SSOs are included in multiple NPDES permits issued to a permittee, a single notification may be made to EPA as directed in the permittee's wastewater or CSO NPDES permit and constitutes compliance with this part.
- d. The permittee shall include and update the SSO inventory in its annual report, including the status of mitigation and corrective measures implemented by the permittee to address each SSO identified pursuant to this part.
- e. The period between detection and elimination of a discharge from the SSO to the MS4 is not a grace period. Discharges from an MS4 that are mixed with an SSO are not authorized by this Permit (part 1.3.a) and remain unlawful until eliminated.

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### 2.3.4.5. System mapping

The permittee shall develop a revised and more detailed map than was required by the MS4-2003 permit. This revised map of the MS4 shall be completed in two phases as outlined below. The mapping shall include a depiction of the permittee's separate storm sewer system in the permit area. The mapping is intended to facilitate the identification of key infrastructure and factors influencing proper system operation, and the potential for illicit sanitary sewer discharges.

- a. Phase I: The system map shall be updated within two (2) years of the permit effective date to include the following information:
  - Outfalls and receiving waters (required by MS4-2003 permit)
  - Open channel conveyances (swales, ditches, etc.)
  - Interconnections with other MS4s and other storm sewer systems
  - Municipally-owned stormwater treatment structures (e.g., detention and retention basins, infiltration systems, bioretention areas, water quality swales, gross particle separators, oil/water separators, or other proprietary systems)
  - Waterbodies identified by name and indication of all use impairments as identified on the most recent EPA approved Massachusetts Integrated List of waters report pursuant to Clean Water Act section 303(d) and 305(b)
  - Initial catchment delineations. Any available system data and topographic information may be used to produce initial catchment delineations. For the purpose of this permit, a catchment is the area that drains to an individual outfall or interconnection.
  
- b. Phase II: The system map shall be updated annually as the following information becomes available during implementation of catchment investigation procedures in part 2.3.4.8. This information must be included in the map for all outfalls within ten (10) years of the permit effective date:
  - Outfall spatial location (latitude and longitude with a minimum accuracy of +/-30 feet)
  - Pipes
  - Manholes
  - Catch basins
  - Refined catchment delineations. Catchment delineations shall be updated to reflect information collected during catchment investigations
  - Municipal sanitary sewer system (if available)
  - Municipal combined sewer system (if applicable).
  
- c. Recommended elements to be included in the system map as information becomes available:
  - Storm sewer material, size (pipe diameter) and age
  - Sanitary sewer system material, size (pipe diameter) and age
  - Privately-owned stormwater treatment structures
  - Where a municipal sanitary sewer system exists, properties known or suspected to be served by a septic system, especially in high-density urban areas
  - Area where the permittee's MS4 has received or could receive flow from septic system discharges (e.g., areas with poor soils, or high ground water elevations unsuitable for conventional subsurface disposal systems)
  - Seasonal high water table elevations impacting sanitary alignments
  - Topography
  - Orthophotography

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- Alignments, dates and representation of work completed (with legend) of past illicit discharge investigations (e.g., flow isolation, dye testing, CCTV)
  - Locations of suspected, confirmed and corrected illicit discharges (with dates and flow estimates).
- d. The mapping may be produced by hand or through computer-aided methods (e.g. GIS). The required scale and detail of the map shall be appropriate to facilitate a rapid understanding of the system by the permittee, EPA and the state. In addition, the mapping shall serve as a planning tool for the implementation and phasing of the IDDE program and demonstration of the extent of complete and planned investigations and corrections. The permittee shall update the mapping as necessary to reflect newly discovered information and required corrections or modifications.
- e. The permittee shall report on the progress towards the completion of the system map in each annual report.

### 2.3.4.6. Written Illicit Discharge Detection and Elimination Program

The IDDE program shall be recorded in a written (hardcopy or electronic) document. The IDDE program shall include each of the elements described in parts 2.3.4.7 and part 2.3.4.8, unless the permittee provides a written explanation within the IDDE program as to why a particular element is not applicable to the permittee.

Notwithstanding the permittee's explanation, EPA may at any time determine that a particular element is in fact applicable to the permittee and require the permittee to add it to the IDDE program. The written (hardcopy or electronic) IDDE program shall be completed within one (1) year of the effective date of the permit and updated in accordance with the milestones of this part. The permittee shall implement the IDDE program in accordance with the goals and milestones contained in this part.

- a. The written (hardcopy or electronic) IDDE program shall include a reference or citation of the authority the permittee will use to implement all aspects of the IDDE program.
- b. Statement of IDDE Program Responsibilities - The permittee shall establish a written (hardcopy or electronic) statement that clearly identifies responsibilities with regard to eliminating illicit discharges. The statement shall identify the lead municipal agency(ies) or department(s) responsible for implementing the IDDE Program as well as any other agencies or departments that may have responsibilities for aspects of the program (e.g., board of health responsibilities for overseeing septic system construction; sanitary sewer system staff; inspectional services for enforcing plumbing codes; town counsel responsibilities in enforcement actions, etc.). Where multiple departments and agencies have responsibilities with respect to the IDDE program specific areas of responsibility shall be defined and processes for coordination and data sharing shall be established and documented.
- c. Program Procedures – The permittee shall include in the written IDDE program all written procedures developed in accordance with the requirements and timelines in parts 2.3.4.7 and 2.3.4.8 below. At a minimum this shall include the written procedures for dry weather outfall screening and sampling and for catchment investigations.

### 2.3.4.7. Assessment and Priority Ranking of Outfalls/Interconnections

The permittee shall assess and priority rank the outfalls in terms of their potential to have illicit discharges and SSOs and the related public health significance. This ranking will determine the priority order for

screening of outfalls and interconnections pursuant to part 2.3.4.7.b, catchment investigations for evidence of illicit discharges and SSOs pursuant to part 2.3.4.8, and provides the basis for determining permit milestones of this part.

a. Outfall/Interconnection Inventory and Initial Ranking:

An initial outfall and interconnection inventory and priority ranking to assess illicit discharge potential based on existing information shall be completed within one (1) year from the effective date of the permit; an updated inventory and ranking will be provided in each annual report thereafter. The inventory shall be updated annually to include data collected in connection with the dry weather screening and other relevant inspections conducted by the permittee.

- i. The outfall and interconnection inventory will identify each outfall and interconnection discharging from the MS4, record its location and condition, and provide a framework for tracking inspections, screenings and other activities under the permittee's IDDE program.
  - An outfall means a point source as defined by 40 CFR § 122.2 as the point where the municipal separate storm sewer discharges to waters of the United States. An outfall does not include open conveyances connecting two municipal separate storm sewers or pipes, tunnels or other conveyances that connect segments of the same stream or other waters of the United States and that are used to convey waters of the United States. (40 CFR § 122.26(b)(9)). However, it is strongly recommended that a permittee inspect all accessible portions of the system as part of this process. Culverts longer than a simple road crossing shall be included in the inventory unless the permittee can confirm that they are free of any connections and simply convey waters of the United States.
  - An interconnection means the point (excluding sheet flow over impervious surfaces) where the permittee's MS4 discharges to another MS4 or other storm sewer system, through which the discharge is conveyed to waters of the United States or to another storm sewer system and eventually to a water of the United States.
- ii. The permittee shall classify each of the permittee's outfalls and interconnections into one of the following categories:
  - Problem Outfalls: Outfalls/interconnections with known or suspected contributions of illicit discharges based on existing information shall be designated as Problem Outfalls. This shall include any outfalls/interconnections where previous screening indicates likely sewer input.<sup>4</sup> Problem Outfalls need not be screened pursuant to part 2.3.4.7.b.
  - High Priority Outfalls: Outfalls/interconnections that have not been classified as Problem Outfalls and that are:
    - discharging to an area of concern to public health due to proximity of public beaches, recreational areas, drinking water supplies or shellfish beds;
    - determined by the permittee as high priority based on the characteristics listed below or other available information;
  - Low Priority Outfalls: Outfalls/interconnections determined by the permittee as low priority based on the characteristics listed below or other available information.
  - Excluded outfalls: Outfalls/interconnections with no potential for illicit discharges may be

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<sup>4</sup> Likely sewer input indicators are any of the following:

- Olfactory or visual evidence of sewage,
- Ammonia  $\geq 0.5$  mg/L, surfactants  $\geq 0.25$  mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
- Ammonia  $\geq 0.5$  mg/L, surfactants  $\geq 0.25$  mg/L, and detectable levels of chlorine.

excluded from the IDDE program. This category is limited to roadway drainage in undeveloped areas with no dwellings and no sanitary sewers; drainage for athletic fields, parks or undeveloped green space and associated parking without services; cross-country drainage alignments (that neither cross nor are in proximity to sanitary sewer alignments) through undeveloped land.

- iii. The permittee shall priority rank outfalls into the categories above (except for excluded outfalls), based on the following characteristics of the defined initial catchment area where information is available:
- Past discharge complaints and reports.
  - Poor receiving water quality- the following guidelines are recommended to identify waters as having a high illicit discharge potential: exceeding water quality standards for bacteria; ammonia levels above 0.5 mg/l; surfactants levels greater than or equal to 0.25 mg/l.
  - Density of generating sites- Generating sites are those places, including institutional, municipal, commercial, or industrial sites, with a potential to generate pollutants that could contribute to illicit discharges. Examples of these sites include, but are not limited to, car dealers; car washes; gas stations; garden centers; and industrial manufacturing areas.
  - Age of development and infrastructure – Industrial areas greater than 40 years old and areas where the sanitary sewer system is more than 40 years old will probably have a high illicit discharge potential. Developments 20 years or younger will probably have a low illicit discharge potential.
  - Sewer conversion – contributing catchment areas that were once serviced by septic systems, but have been converted to sewer connections may have a high illicit discharge potential.
  - Historic combined sewer systems – contributing areas that were once serviced by a combined sewer system, but have been separated may have a high illicit discharge potential.
  - Surrounding density of aging septic systems – Septic systems thirty years or older in residential land use areas are prone to have failures and may have a high illicit discharge potential.
  - Culverted streams – any river or stream that is culverted for distances greater than a simple roadway crossing may have a high illicit discharge potential.
  - Water quality limited waterbodies that receive a discharge from the MS4 or waters with approved TMDLs applicable to the permittee, where illicit discharges have the potential to contain the pollutant identified as the cause of the water quality impairment.
  - The permittee may also consider additional relevant characteristics, including location-specific characteristics; if so, the permittee shall include the additional characteristics in its written (hardcopy or electronic) IDDE program.
- b. Dry Weather Outfall and Interconnection Screening and Sampling  
All outfalls/interconnections (excluding Problem and excluded Outfalls) shall be inspected for the presence of dry weather flow within three (3) years of the permit effective date. The permittee shall screen all High and Low Priority Outfalls in accordance with their initial ranking developed at part 2.3.4.7.a.
- i. Written procedure: The permittee shall develop an outfall and interconnection screening and sampling procedure to be included in the IDDE program within one (1) year of the permit effective date. This procedure shall include the following procedures for:
- sample collection,
  - use of field kits,

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- storage and conveyance of samples (including relevant hold times), and
- field data collection and storage.

An example screening and sampling protocol (*EPA New England Bacterial Source Tracking Protocol*) can be found on EPA's website.

- ii. Weather conditions: Dry weather screening and sampling shall proceed only when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period and no significant snow melt is occurring.
- iii. Screening requirements: For each outfall/interconnection:
  1. The permittee shall record all of the following information and include it in the outfall/interconnection inventory and priority ranking:
    - unique identifier,
    - receiving water,
    - date of most recent inspection,
    - dimensions,
    - shape,
    - material (concrete, PVC),
    - spatial location (latitude and longitude with a minimum accuracy of +/-30 feet,
    - physical condition,
    - indicators of potential non-stormwater discharges (including presence or evidence of suspect flow and sensory observations such as odor, color, turbidity, floatables, or oil sheen).
  2. If an outfall/interconnection is inaccessible or submerged, the permittee shall proceed to the first accessible upstream manhole or structure for the observation and sampling and report the location with the screening results.
  3. If no flow is observed, but evidence of illicit flow exists, the permittee shall revisit the outfall during dry weather within one week of the initial observation, if practicable, to perform a second dry weather screening and sample any observed flow (proceed as in iv. below).
  4. Where dry weather flow is found at an outfall/interconnection, at least one (1) sample shall be collected, and:
    - a) Samples shall be analyzed at a minimum for:
      - ammonia,
      - chlorine,
      - conductivity,
      - salinity,
      - *E. coli* (freshwater receiving water) or enterococcus (saline or brackish receiving water),
      - surfactants (such as MBAS),
      - temperature, and

- pollutants of concern<sup>5</sup>
- b) All analyses with the exception of indicator bacteria and pollutants of concern can be performed with field test kits or field instrumentation and are not subject to 40 CFR part 136 requirements. Sampling for bacteria and pollutants of concern shall be conducted using the analytical methods found in 40 CFR §136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR §136. Sampling for ammonia and surfactants must use sufficiently sensitive methods to detect those parameters at or below the threshold indicator concentrations of 0.5 mg/L for ammonia and 0.25 mg/L for surfactants. Sampling for residual chlorine must use a method with a detection limit of 0.02 mg/L or 20 ug/L.
  - iv. The permittee may rely on screening conducted under the MS4-2003 permit, pursuant to an EPA enforcement action, or by the state or EPA to the extent that it meets the requirements of part 2.3.4.7.b.iii.4. All data shall be reported in each annual report. Permittees that have conducted substantially equivalent monitoring to that required by part 2.3.4.7.b as part of an EPA enforcement action can request an exemption from the requirements of part 2.3.4.7.b by submitting a written request to EPA and retaining exemption approval from EPA as part of the SWMP. Until the permittee receives formal written approval of the exemption from part 2.3.4.7.b from EPA the permittee remains subject to all requirements of part 2.3.4.7.b.
  - v. The permittee shall submit all screening data used in compliance with this part in its Annual Report.
  - c. Follow-up ranking of outfalls and interconnections:
    - i. The permittee's outfall and interconnection ranking (2.3.4.7.a) shall be updated to reprioritize outfalls and interconnections based on information gathered during dry weather screening (part 2.3.4.7.b).
    - ii. Outfalls/interconnections where relevant information was found indicating sewer input to the MS4 or sampling results indicating sewer input<sup>6</sup> shall be considered highly likely to contain illicit discharges from sanitary sources, and such outfalls/interconnections shall be ranked at the top of the High Priority Outfalls category for investigation. At this time, permittees may choose to rank other outfalls and interconnections based on any new information from the dry weather screening.
    - iii. The ranking can be updated continuously as dry weather screening information becomes available, but shall be completed within three (3) years of the effective date of the permit.

#### 2.3.4.8. Catchment Investigations

The permittee shall develop a systematic procedure to investigate each catchment associated with an

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<sup>5</sup> Where the discharge is directly into a water quality limited water or a water subject to an approved TMDL as indicated in Appendix F; the sample shall be analyzed for the pollutant(s) of concern identified as the cause of the impairment as specified in Appendix G

<sup>6</sup> Likely sewer input indicators are any of the following:

- Olfactory or visual evidence of sewage,
- Ammonia  $\geq$  0.5 mg/L, surfactants  $\geq$  0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
- Ammonia  $\geq$  0.5 mg/L, surfactants  $\geq$  0.25 mg/L, and detectable levels of chlorine.

outfall or interconnection within their MS4 system.

a. Timelines:

- A written catchment investigation procedure shall be developed within 18 months of the permit effective date in accordance with the requirements of part 2.3.4.8.b below.
- Investigations of catchments associated with Problem Outfalls shall begin no later than two (2) years from the permit effective date.
- Investigations of catchments associated with High and Low Priority Outfalls shall follow the ranking of outfalls updated in part 2.3.4.7.c.
- Investigations of catchments associated with Problem Outfalls shall be completed within seven (7) years of the permit effective date
- Investigations of catchments where any information gathered on the outfall/interconnection identifies sewer input<sup>7</sup> shall be completed within seven (7) years of the permit effective date.
- Investigations of catchments associated with all High- and Low-Priority Outfalls shall be completed within ten (10) years of the permit effective date.

\*For the purposes of these milestones, an individual catchment investigation will be considered complete if all relevant procedures in part 2.3.4.8.c. and 2.3.4.8.d. below have been completed.

b. A written catchment investigation procedure shall be developed that:

- i. **Identifies maps, historic plans and records, and other sources of data**, including but not limited to plans related to the construction of the storm drain and of sanitary sewers, prior work performed on the storm drains or sanitary sewers, board of health or other municipal data on septic system failures or required upgrades, and complaint records related to SSOs, sanitary sewer surcharges, and septic system breakouts. These data sources will be used in identifying system vulnerability factors within each catchment.
- ii. **Includes a manhole inspection methodology** that shall describe a storm drain network investigation that involves systematically and progressively observing, sampling (as required below) and evaluating key junction manholes (see definition in Appendix A) in the MS4 to determine the approximate location of suspected illicit discharges or SSOs. The manhole inspection methodology may either start from the outfall and work up the system or start from the upper parts of the catchment and work down the system or be a combination of both practices. Either method must, at a minimum, include an investigation of each key junction manhole within the MS4, even where no evidence of an illicit discharge is observed at the outfall. The manhole inspection methodology must describe the method the permittee will use. The manhole inspection methodology shall include procedures for dry and wet weather investigations.
- iii. **Establishes procedures to isolate and confirm sources of illicit discharges** where manhole investigations or other physical evidence or screening has identified that MS4 alignments are influenced by illicit discharges or SSOs. These shall include isolation of the drainage area for implementation of more detailed investigations, inspection of additional manholes along the alignment to refine the location of potential contaminant sources, and methods such as sandbagging key junction manhole inlets, targeted internal plumbing inspections, dye testing,

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<sup>7</sup> Likely sewer input indicators are any of the following:

- Olfactory or visual evidence of sewage,
- Ammonia  $\geq 0.5$  mg/L, surfactants  $\geq 0.25$  mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
- Ammonia  $\geq 0.5$  mg/L, surfactants  $\geq 0.25$  mg/L, and detectable levels of chlorine.

video inspections, or smoke testing to isolate and confirm the sources.

c. Requirements for each catchment investigation associated with an outfall/interconnection:

- i. For each catchment being investigated, the permittee shall review relevant mapping and historic plans and records gathered in accordance with Part 2.3.4.8.b.i. This review shall be used to identify areas within the catchment with higher potential for illicit connections. The permittee shall identify and record the presence of any of the following specific **System Vulnerability Factors (SVFs)**:
- History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages;
  - Common or twin-invert manholes serving storm and sanitary sewer alignments;
  - Common trench construction serving both storm and sanitary sewer alignments;
  - Crossings of storm and sanitary sewer alignments where the sanitary system is shallower than the storm drain system;
  - Sanitary sewer alignments known or suspected to have been constructed with an underdrain system;
  - Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints;
  - Areas formerly served by combined sewer systems;
  - Sanitary sewer infrastructure defects such as leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through Inflow/Infiltration Analyses, Sanitary Sewer Evaluation Surveys, or other infrastructure investigations.

EPA recommends the permittee include the following in their consideration of System Vulnerability Factors:

- Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could readily result in SSOs;
- Any sanitary sewer and storm drain infrastructure greater than 40 years old;
- Widespread code-required septic system upgrades required at property transfers (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than poor owner maintenance);
- History of multiple Board of Health actions addressing widespread septic system failures (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than poor owner maintenance);

The permittee shall document the presence or absence of System Vulnerability Factors for each catchment, retain this documentation as part of its IDDE program, and report this information in Annual Reports. Catchments with a minimum of one (1) System Vulnerability Factor are subject to wet weather sampling requirements of part 2.3.4.8.c.ii.2.

- ii. For each catchment, the permittee must inspect key junction manholes and gather catchment information on the locations of MS4 pipes, manholes, and the extent of the contributing catchment.

1. For all catchments

- a) Infrastructure information shall be incorporated into the permittee's mapping required at part 2.3.4.5; the permittee will refine their catchment delineation based on the field investigation where appropriate.

- b) The SVF inventory for the catchment will be updated based on information obtained during the inspection, including common (twin invert) manholes, directly piped connections between storm drains and sanitary sewer infrastructure, common weir walls, sanitary sewer underdrain connections and other structural vulnerabilities where sanitary discharges could enter the storm drain system during wet weather.
    - 1) **Where a minimum of one (1) SVF is identified based on previous information or the investigation, a wet weather investigation must be conducted at the associated outfall (see below).**
  - c) During dry weather, key junction manholes<sup>8</sup> shall be opened and inspected systematically for visual and olfactory evidence of illicit connections (e.g., excrement, toilet paper, gray filamentous bacterial growth, or sanitary products present).
    - 1) If flow is observed, the permittee shall sample the flow at a minimum for ammonia, chlorine and surfactants and can use field kits for these analyses.
    - 2) Where sampling results or visual or olfactory evidence indicate potential illicit discharges or SSOs, the area draining to the junction manhole shall be flagged for further upstream investigation.
  - d) Key junction and subsequent manhole investigations will proceed until the location of suspected illicit discharges or SSOs can be isolated to a pipe segment between two manholes. If no evidence of an illicit discharge is found, catchment investigations will be considered complete upon completion of key junction manhole sampling.
2. For all catchments with a minimum of one (1) SVF identified
- a) The permittee shall meet the requirements above for dry weather screening
  - b) The permittee shall inspect and sample under wet weather conditions to the extent necessary to determine whether wet weather-induced high flows in sanitary sewers or high groundwater in areas served by septic systems result in discharges of sanitary flow to the MS4.
    - 1) The permittee shall conduct at least one wet weather screening and sampling at the outfall that includes the same parameters required during dry weather screening, part 2.3.4.7.b.iii.4.
    - 2) Wet weather sampling and screening shall proceed during or after a storm event of sufficient depth or intensity to produce a stormwater discharge. EPA strongly recommends sampling during the spring (March through June) when groundwater levels are relatively high.
    - 3) The permit does not require a minimum rainfall event prior to wet weather screening. However, permittees may incorporate provisions that assist in targeting such discharges, including avoiding sampling during the initial period of discharge (“first flush”) and/or identifying minimum storm event intensities likely to trigger sanitary sewer interconnections.
  - c) This sampling can be done upon completion of any dry weather investigation but must be completed before the catchment investigation is marked as complete.
- iii. All data collected as part of the dry and wet weather catchment investigations shall be recorded and reported in each annual report.

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<sup>8</sup> Where catchments do not contain junction manholes, the dry weather screening and sampling shall be considered as meeting the manhole inspection requirement. In these catchments, dry weather screenings that indicate potential presence of illicit discharges shall be further investigated pursuant to part 2.3.4.8.d. Investigations in these catchments may be considered complete where dry weather screening reveals no flow; no evidence of illicit discharges or SSOs is indicated through sampling results or visual or olfactory means; and no wet weather System Vulnerability Factors are identified.

d. Identification/Confirmation of illicit source

Where the source of an illicit discharge has been approximated between two manholes in the permittee's MS4, the permittee shall isolate and identify/confirm the source of the illicit discharge using more detailed methods identified in their written procedure (2.3.4.8.b.iii). For outfalls that contained evidence of an illicit discharge, catchment investigations will be considered complete upon confirmation of all illicit sources.

e. Illicit discharge removal

When the specific source of an illicit discharge is identified, the permittee shall exercise its authority as necessary to require its removal pursuant to part 2.3.4.2 or 2.3.4.3.

i. For each confirmed source the permittee shall include in the annual report the following information:

- the location of the discharge and its source(s);
- a description of the discharge;
- the method of discovery;
- date of discovery;
- date of elimination, mitigation or enforcement action OR planned corrective measures and a schedule for completing the illicit discharge removal; and
- estimate of the volume of flow removed.

ii. Within one year of removal of all identified illicit discharges within a catchment area, confirmatory outfall or interconnection screening shall be conducted. The confirmatory screening shall be conducted in dry weather unless System Vulnerability Factors have been identified, in which case both dry weather and wet weather confirmatory screening shall be conducted. If confirmatory screening indicates evidence of additional illicit discharges, the catchment shall be scheduled for additional investigation.

2.3.4.9. Indicators of IDDE Program Progress

The permittee shall define or describe indicators for tracking program success and evaluate and report on the overall effectiveness of the IDDE program in each annual report. At a minimum the permittee shall document in each annual report:

- the number of SSOs and illicit discharges identified and removed,
- the number and percent of total outfall catchments served by the MS4 evaluated using the catchment investigation procedure,
- all dry weather and wet weather screening and sampling results and
- the volume of sewage removed

2.3.4.10 Ongoing Screening

Upon completion of all catchment investigations pursuant to part 2.3.4.8.c and illicit discharge removal and confirmation (if necessary) pursuant to paragraph 2.3.4.8.e, each outfall or interconnection shall be reprioritized for screening in accordance with part 2.3.4.7.a and scheduled for ongoing screening once every five years. Ongoing screening shall consist of dry weather screening and sampling consistent with part 2.3.4.7.b; wet weather screening and sampling shall also be required at outfalls where wet weather screening was required due to SVFs and shall be conducted in accordance with part 2.3.4.8.c.ii. All sampling results shall be reported in the permittee's annual report.

2.3.4.11 Training

The permittee shall, at a minimum, annually provide training to employees involved in IDDE program about the program, including how to recognize illicit discharges and SSOs. The permittee shall report on the frequency and type of employee training in the annual report.

**2.3.5. Construction Site Stormwater Runoff Control**

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. The construction site stormwater runoff control program required by this permit is a separate and distinct program from EPA's stormwater construction permit program.

(<http://cfpub1.epa.gov/npdes/stormwater/cgp.cfm>)

- a. Permittees shall implement and enforce a program to reduce pollutants in any stormwater runoff discharged to the MS4 from all construction activities that result in a land disturbance of greater than or equal to one acre within the regulated area. The permittee's program shall include disturbances less than one acre if that disturbance is part of a larger common plan of development or sale that would disturb one or more acres. Permittees authorized under the MS4-2003 permit shall continue to implement and enforce their existing program and modify as necessary to meet the requirements of this part.
- b. The permittee does not need to apply its construction program requirements to projects that receive a waiver from EPA under the provisions of 40 CFR § 122.26(b) (15) (i).
- c. The permittee shall develop and implement a construction site runoff control program that includes the elements in Paragraphs i. through v. of this part:
  - i. An ordinance or regulatory mechanism that requires the use of sediment and erosion control practices at construction sites. In addition to addressing sediment and erosion control, the ordinance must include controls for other wastes on construction sites such as demolition debris, litter and sanitary wastes. Development of an ordinance or other regulatory mechanism was a requirement of the MS4-2003 permit (See part II.B.4 and part IV.B.4).The ordinance or other regulatory mechanism required by the MS4-2003 permit shall have been effective by May 1, 2008.
  - ii. Written (hardcopy or electronic) procedures for site inspections and enforcement of sediment and erosion control measures. If not already existing, these procedures shall be completed within one (1) year from the effective date of the permit. The procedures shall clearly define who is responsible for site inspections as well as who has authority to implement enforcement procedures. The program shall provide that the permittee may, to the extent authorized by law, impose sanctions to ensure compliance with the local program. These procedures and regulatory authorities shall be documented in the SWMP.
  - iii. Requirements for construction site operators performing land disturbance activities within the MS4 jurisdiction that result in stormwater discharges to the MS4 to implement a sediment and erosion control program that includes BMPs appropriate for the conditions at the construction site. The program may include references to BMP

design standards in state manuals, such as the Massachusetts Stormwater Handbook<sup>9</sup>, or design standards developed by the MS4. EPA supports and encourages the use of design standards in local programs. Examples of appropriate sediment and erosion control measures for construction sites include local requirements to:

1. Minimize the amount of disturbed area and protect natural resources;
  2. Stabilize sites when projects are complete or operations have temporarily ceased;
  3. Protect slopes on the construction site;
  4. Protect all storm drain inlets and armor all newly constructed outlets;
  5. Use perimeter controls at the site;
  6. Stabilize construction site entrances and exits to prevent off-site tracking;
  7. Inspect stormwater controls at consistent intervals.
- iv. Requirements for construction site operators within the MS4 jurisdiction to control wastes, including but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes. These wastes may not be discharged to the MS4.
- v. Written procedures for site plan review and inspection and enforcement. If not already existing, the procedures for site plan review and inspection and enforcement shall be completed within one (1) year from the effective date of the permit. The site plan review procedure shall include a pre-construction review by the permittee of the site design, the planned operations at the construction site, planned BMPs during the construction phase, and the planned BMPs to be used to manage runoff created after development. The review procedure shall incorporate procedures for the consideration of potential water quality impacts, and procedures for the receipt and consideration of information submitted by the public. The site plan review procedure shall also include evaluation of opportunities for use of low impact design and green infrastructure. When the opportunity exists, the permittee shall encourage project proponents to incorporate these practices into the site design. The procedures for site inspections conducted by the permittee shall include the requirement that inspections occur during construction of BMPs as well as after construction of BMPs to ensure they are working as described in the approved plans, clearly defined procedures for inspections including qualifications necessary to perform the inspections, the use of mandated inspection forms if appropriate, and procedure for tracking the number of site reviews, inspections, and enforcement actions. This tracking information shall be included as part of each annual report required by part 4.4.

#### **2.3.6. Stormwater Management in New Development and Redevelopment (Post Construction Stormwater Management)**

Objective: The objective of this control measure is to reduce the discharge of pollutants found in stormwater through the retention or treatment of stormwater after construction on new or redeveloped sites. For the purposes of this part (2.3.6.), the following definitions apply:

**site** is defined as the area extent of construction activities, including but not limited to the creation of new impervious cover and improvement of existing impervious cover (e.g. repaving not covered by 2.3.6.a.ii.4.d.)

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<sup>9</sup> The handbook is available at: <http://www.mass.gov/dep/water/laws/policies.htm#storm>

**new development** is defined as any construction activities or land alteration resulting in total earth disturbances equal to or greater than 1 acre (or activities that are part of a larger common plan of development disturbing greater than 1 acre) on an area that has not previously been developed to include impervious cover.

**redevelopment** is defined as any construction, land alteration, or improvement of impervious surfaces resulting in total earth disturbances equal to or greater than 1 acre (or activities that are part of a larger common plan of development disturbing greater than 1 acre) that does not meet the definition of new development (see above).

- a. Permittees shall develop, implement, and enforce a program to address post-construction stormwater runoff from all new development and redevelopment sites that disturb one or more acres and discharge into the permittees MS4 at a minimum. Permittees authorized under the MS4-2003 permit shall continue to implement and enforce their program and modify as necessary to meet the requirements of this part.
  - i. The permittee's new development/ redevelopment program shall include sites less than one acre if the site is part of a larger common plan of development or redevelopment which disturbs one or more acre.
  - ii. The permittee shall develop or modify, as appropriate, an ordinance or other regulatory mechanism within two (2) years of the effective date of the permit to contain provisions that are at least as stringent as the following:
    1. Low Impact Development (LID) site planning and design strategies must be used to the maximum extent feasible.
    2. The design of treatment and infiltration practices should follow the guidance in Volume 2 of the Massachusetts Stormwater Handbook, as amended, or other federally or State approved<sup>10</sup> BMP design guidance.
    3. Stormwater management systems on new development sites shall be designed to:
      - a) Not allow new stormwater conveyances to discharge untreated stormwater in accordance with Massachusetts Stormwater Handbook Standard 1;
      - b) Control peak runoff rates in accordance with Massachusetts Stormwater Handbook Standard 2<sup>11</sup>;
      - c) Recharge groundwater in accordance with Massachusetts Stormwater Handbook Standard 3<sup>12</sup>;
      - d) Eliminate or reduce the discharge of pollutants from land uses with higher pollutant loads as defined in the Massachusetts Stormwater Handbook in accordance with Massachusetts Stormwater Handbook Standard 5;
      - e) Protect Zone II or Interim Wellhead Protection Areas of public water supplies in accordance with Massachusetts Stormwater Handbook Standard 6<sup>13</sup>;

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<sup>10</sup> State approved includes any state in the United States, including, but not limited to, approved guidance by the Commonwealth of Massachusetts

<sup>11</sup> Requirement necessary for Section 401 water quality certification by Massachusetts

<sup>12</sup> Requirement necessary for Section 401 water quality certification by Massachusetts

<sup>13</sup> Requirement necessary for Section 401 water quality certification by Massachusetts

- f) Implement long term maintenance practices in accordance with Massachusetts Stormwater Handbook Standard 9; and
- g) Require that all stormwater management systems be designed to:
  - 1) Retain the volume of runoff equivalent to, or greater than, one (1.0) inch multiplied by the total post-construction impervious surface area on the site AND/OR
  - 2) Remove 90% of the average annual load of Total Suspended Solids (TSS) generated from the total post-construction impervious area on the site<sup>14</sup> AND 60% of the average annual load of Total Phosphorus (TP) generated from the total post-construction impervious surface area on the site<sup>14</sup>. Pollutant removal shall be calculated consistent with EPA Region 1's BMP Performance Extrapolation Tool or other BMP performance evaluation tool provided by EPA Region 1, where available. If EPA Region 1 tools do not address the planned or installed BMP performance any federally or State approved<sup>15</sup> BMP design guidance or performance standards (e.g. State stormwater handbooks and design guidance manuals) may be used to calculate BMP performance.

#### 4. Redevelopment Requirements

- a) Stormwater management systems on Redevelopment sites shall meet the following sections of part 2.3.6.a.ii.3 to the maximum extent feasible:
  - 1) Part 2.3.6.a.ii.3(a) (Massachusetts Stormwater Standard 1);
  - 2) Part 2.3.6.a.ii.3(b) (Massachusetts Stormwater Standard 2);
  - 3) Part 2.3.6.a.ii.3(c) (Massachusetts Stormwater Standard 3); and
  - 4) The pretreatment and structural best management practices requirements of 2.3.6.a.ii.3(d) and 2.3.6.a.ii.3(e) (Massachusetts Stormwater Standards 5 and 6).
- b) Stormwater management systems on Redevelopment sites shall also improve existing conditions by requiring that stormwater management systems be designed to:
  - 1) Retain the volume of runoff equivalent to, or greater than, 0.80 inch multiplied by the total post-construction impervious surface area on the site AND/OR
  - 2) Remove 80% of the average annual post-construction load of Total Suspended Solids (TSS) generated from the total post-construction impervious area on the site AND 50% of the average annual load of Total Phosphorus (TP) generated from the total post-construction impervious surface area on the site. Pollutant removal shall be calculated consistent with EPA Region 1's BMP Performance Extrapolation Tool or other BMP performance evaluation tool provided by EPA Region 1 where available. If EPA Region 1 tools do not address the planned or installed BMP performance any federally or State approved BMP design guidance or performance standards (e.g. State stormwater handbooks and design guidance manuals) may be used to calculate BMP performance.
- c) Stormwater management systems on redevelopment sites may utilize offsite mitigation within the same USGS HUC10 as the redevelopment site

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<sup>14</sup> The required removal percentage is not required for each storm, it is the average removal over a year that is required

<sup>15</sup> See footnote 14

- to meet the equivalent retention or pollutant removal requirements in part 2.3.6.a.ii.4(b).
- d) Redevelopment activities that are exclusively limited to maintenance and improvement of existing roadways, (including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems, and repaving projects) shall improve existing conditions where feasible and are exempt from part 2.3.6.a.ii.4(a), part 2.3.6.a.ii.4(b) and part 2.3.6.a.ii.4(c). Roadway widening or improvements that increase the amount of impervious area on the redevelopment site by greater than or equal to a single lane width shall meet the requirements of part 2.3.6.a.ii.4(a) – (c) fully.
- iii. The permittee shall require, at a minimum, the submission of as-built drawings no later than two (2) years after completion of construction projects. The as-built drawings must depict all on site controls, both structural and non-structural, designed to manage the stormwater associated with the completed site (post construction stormwater management). The new development/redevelopment program shall have procedures to ensure adequate long-term operation and maintenance of stormwater management practices that are put in place after the completion of a construction project. These procedures may include the use of dedicated funds or escrow accounts for development projects or the acceptance of ownership by the permittee of all privately owned BMPs. These procedures may also include the development of maintenance contracts between the owner of the BMP and the permittee. Alternatively, these procedures may include the submission of an annual certification documenting the work that has been done over the last 12 months to properly operate and maintain the stormwater control measures. The procedures to require submission of as-built drawings and ensure long term operation and maintenance shall be a part of the SWMP. The permittee shall report in the annual report on the measures that the permittee has utilized to meet this requirement.
- b. Within four (4) years of the effective date of this permit, the permittee shall develop a report assessing current street design and parking lot guidelines and other local requirements that affect the creation of impervious cover. This assessment shall be used to provide information to allow the permittee to determine if changes to design standards for streets and parking lots can be made to support low impact design options. If the assessment indicates that changes can be made, the assessment shall include recommendations and proposed schedules to incorporate policies and standards into relevant documents and procedures to minimize impervious cover attributable to parking areas and street designs. The permittee shall implement all recommendations, in accordance with the schedules, contained in the assessment. The local planning board and local transportation board should be involved in this assessment. This assessment shall be part of the SWMP. The permittee shall report in each annual report on the status of this assessment including any planned or completed changes to local regulations and guidelines.
- c. Within four (4) years from the effective date of the permit, the permittee shall develop a report assessing existing local regulations to determine the feasibility of making, at a minimum, the following practices allowable when appropriate site conditions exist:
- i. Green roofs;
  - ii. Infiltration practices such as rain gardens, curb extensions, planter gardens, porous and pervious pavements, and other designs to manage stormwater using landscaping and structured or augmented soils; and

- iii. Water harvesting devices such as rain barrels and cisterns, and the use of stormwater for non-potable uses.

The assessment should indicate if the practices are allowed in the MS4 jurisdiction and under what circumstances are they allowed. If the practices are not allowed, the permittee shall determine what hinders the use of these practices, what changes in local regulations may be made to make them allowable, and provide a schedule for implementation of recommendations. The permittee shall implement all recommendations, in accordance with the schedules, contained in the assessment. The permittee shall report in each annual report on its findings and progress towards making the practices allowable. (Information available at:

<http://www.epa.gov/region1/npdes/stormwater/assets/pdf/AddressingBarrier2LID.pdf> and <http://www.mapc.org/resources/low-impact-dev-toolkit/local-codes-lid>)

- d. Four (4) years from the effective date of this permit, the permittee shall identify a minimum of 5 permittee-owned properties that could potentially be modified or retrofitted with BMPs designed to reduce the frequency, volume, and pollutant loads of stormwater discharges to and from its MS4 through the reduction of impervious area. Properties and infrastructure for consideration shall include those with the potential for reduction of on-site impervious area (IA) as well as those that could provide reduction of off-site IA. At a minimum, the permittee shall consider municipal properties with significant impervious cover (including parking lots, buildings, and maintenance yards) that could be modified or retrofitted. MS4 infrastructure to be considered includes existing street right-of-ways, outfalls and conventional stormwater conveyances and controls (including swales and detention practices) that could be readily modified or retrofitted to provide reduction in frequency, volume or pollutant loads of such discharges through reduction of impervious cover.

In determining the potential for modifying or retrofitting particular properties, the permittee shall consider factors such as access for maintenance purposes; subsurface geology; depth to water table; proximity to aquifers and subsurface infrastructure including sanitary sewers and septic systems; and opportunities for public use and education. In determining its priority ranking, the permittee shall consider factors such as schedules for planned capital improvements to storm and sanitary sewer infrastructure and paving projects; current storm sewer level of service; and control of discharges to water quality limited waters, first or second order streams, public swimming beaches, drinking water supply sources and shellfish growing areas.

Beginning with the fifth year annual report and in each subsequent annual report, the permittee shall identify additional permittee owned sites and infrastructure that could be retrofitted such that the permittee maintains a minimum of 5 sites in their inventory, until such a time as when the permittee has less than 5 sites remaining. In addition, the permittee shall report on all properties that have been modified or retrofitted with BMPs to mitigate IA that were inventoried in accordance with this part. The permittee may also include in its annual report non-MS4 owned property that has been modified or retrofitted with BMPs to mitigate IA.

### **2.3.7. Good House Keeping and Pollution Prevention for Permittee Owned Operations**

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.

#### **a. Operations and Maintenance Programs**

- i. Within two (2) years from the effective date of the permit, the permittee shall develop, if not already developed, written (hardcopy or electronic) operations and maintenance

procedures for the municipal activities listed below in part 2.3.7.a.ii. These written procedures shall be included as part of the SWMP.

- ii. Within two (2) year of the effective date of this permit, the permittee shall develop an inventory of all permittee owned facilities within the categories listed below. The permittee shall review this inventory annually and update as necessary.
  1. Parks and open space: Establish procedures to address the proper use, storage, and disposal of pesticides, herbicides, and fertilizers including minimizing the use of these products and using only in accordance manufacturer's instruction. Evaluate lawn maintenance and landscaping activities to ensure practices are protective of water quality. Protective practices include reduced mowing frequencies, proper disposal of lawn clippings, and use of alternative landscaping materials (e.g., drought resistant planting). Establish pet waste handling collection and disposal locations at all parks and open space where pets are permitted, including the placing of proper signage concerning the proper collection and disposal of pet waste. Establish procedures to address waterfowl congregation areas where appropriate to reduce waterfowl droppings from entering the MS4. Establish procedures for management of trash containers at parks and open space (scheduled cleanings; sufficient number). Establish procedures to address erosion or poor vegetative cover when the permittee becomes aware of it; especially if the erosion is within 50 feet of a surface water.
  2. Buildings and facilities where pollutants are exposed to stormwater runoff: This includes schools (to the extent they are permittee-owned or operated), town offices, police, and fire stations, municipal pools and parking garages and other permittee-owned or operated buildings or facilities. Evaluate the use, storage, and disposal of petroleum products and other potential stormwater pollutants. Provide employee training as necessary so that those responsible for handling these products know proper procedures. Ensure that Spill Prevention Plans are in place, if applicable, and coordinate with the fire department as necessary. Develop management procedures for dumpsters and other waste management equipment. Sweep parking lots and keep areas surrounding the facilities clean to reduce runoff of pollutants.
  3. Vehicles and Equipment: Establish procedures for the storage of permittee vehicles. Vehicles with fluid leaks shall be stored indoors or containment shall be provided until repaired. Evaluate fueling areas owned or operated by the permittee. If possible, place fueling areas under cover in order to minimize exposure. Establish procedures to ensure that vehicle wash waters are not discharged to the municipal storm sewer system or to surface waters. This permit does not authorize such discharges.
- iii. Infrastructure Operations and Maintenance
  1. The permittee shall establish within two (2) year of the effective date of the permit a written (hardcopy or electronic) program detailing the activities and procedures the permittee will implement so that the MS4 infrastructure is maintained in a timely manner to reduce the discharge of pollutants from the MS4. If the permittee has an existing program to maintain its MS4 infrastructure

in a timely manner to reduce or eliminate the discharge of pollutants from the MS4, the permittee shall document the program in the SWMP.

2. The permittee shall optimize routine inspections, cleaning and maintenance of catch basins such that the following conditions are met:
  - Prioritize inspection and maintenance for catch basins located near construction activities (roadway construction, residential, commercial, or industrial development or redevelopment). Clean catch basins in such areas more frequently if inspection and maintenance activities indicate excessive sediment or debris loadings.
  - Establish a schedule with a goal that the frequency of routine cleaning will ensure that no catch basin at anytime will be more than 50 percent full.
  - If a catch basin sump is more than 50 percent full during two consecutive routine inspections/cleaning events, the permittee shall document that finding, investigate the contributing drainage area for sources of excessive sediment loading, and to the extent practicable, abate contributing sources. The permittee shall describe any actions taken in its annual report.
  - For the purposes of this part, an excessive sediment or debris loading is a catch basin sump more than 50 percent full. A catch basin sump is more than 50 percent full if the contents within the sump exceed one half the distance between the bottom interior of the catch basin to the invert of the deepest outlet of the catch basin.
  - The permittee shall document in the SWMP and in the first annual report its plan for optimizing catch basin cleaning, inspection plans, or its schedule for gathering information to develop the optimization plan. Documentation shall include metrics and other information used to reach the determination that the established plan for cleaning and maintenance is optimal for the MS4. The permittee shall keep a log of catch basins cleaned or inspected.
  - The permittee shall 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.
3. The permittee shall establish and implement procedures for sweeping and/or cleaning streets, and permittee-owned parking lots. All streets with the exception of rural uncurbed roads with no catch basins or high speed limited access highways shall be swept and/or cleaned a minimum of once per year in the spring (following winter activities such as sanding). The procedures shall also include more frequent sweeping of targeted areas determined by the permittee on the basis of pollutant load reduction potential, based on inspections, pollutant loads, catch basin cleaning or inspection results, land use, water quality limited or TMDL waters or other relevant factors as determined by the permittee. The permittee shall report in each annual report the number of miles cleaned or the volume or mass of material removed.

For rural uncurbed roadways with no catch basins and limited access highways, the permittee shall either meet the minimum frequencies above, or develop and implement an inspection, documentation and targeted sweeping plan within two (2) years of the effective date of the permit, and submit such plan with its year one annual report.

4. The permittee shall ensure proper storage of catch basin cleanings and street sweepings prior to disposal or reuse such that they do not discharge to receiving waters. These materials should be managed in compliance with current MassDEP policies:
    - For catch basins cleanings:  
<http://www.mass.gov/eea/agencies/massdep/recycle/regulations/management-of-catch-basin-cleanings.html>
    - For street sweepings:  
<http://www.mass.gov/eea/docs/dep/recycle/laws/stsweep.pdf>.
  5. The permittee shall establish and implement procedures for winter road maintenance including the use and storage of salt and sand; minimize the use of sodium chloride and other salts, and evaluate opportunities for use of alternative materials; and ensure that snow disposal activities do not result in disposal of snow into waters of the United States. For purposes of this MS4 Permit, salt shall mean any chloride-containing material used to treat paved surfaces for deicing, including sodium chloride, calcium chloride, magnesium chloride, and brine solutions.
  6. The permittee shall establish and implement inspection and maintenance frequencies and procedures for all stormwater treatment structures such as water quality swales, retention/detention basins, infiltration structures, proprietary treatment devices or other similar structures. All permittee-owned stormwater treatment structures (excluding catch basins) shall be inspected annually at a minimum.
- iv. The permittee shall report in the annual report on the status of the inventory required by this part and any subsequent updates; the status of the O&M programs for the permittee-owned facilities and activities in part 2.3.7.a.ii; and the maintenance activities associated with each.
  - v. The permittee shall keep a written (hardcopy or electronic) record of all required activities including but not limited to maintenance activities, inspections and training required by part 2.3.7.a. The permittee shall maintain, consistent with part 4.2.a, all records associated with maintenance and inspection activities required by part 2.3.7.a.

b. Stormwater Pollution Prevention Plan (SWPPP)

The permittee shall develop and fully implement a SWPPP for each 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 as determined by the permittee. If facilities are located at the same property, the permittee may develop one SWPPP for the entire property. The SWPPP is a separate and different document from the SWMP required in part 1.10. A SWPPP does not need to be developed for a facility if the permittee has either developed a SWPPP or received a no exposure certification for the discharge under the Multi-Sector General Permit or the discharge is authorized under another NPDES permit.

- i. No later than two (2) years from the effective date of the permit, the permittee shall develop and implement a written (hardcopy or electronic) SWPPP for the facilities

described above. The SWPPP shall be signed in accordance with the signatory requirements of Appendix B – Subparagraph 11.

ii. The SWPPP shall contain the following elements:

1. Pollution Prevention Team

Identify the staff on the team, by name and title. If the position is unstaffed, the title of the position should be included and the SWPPP updated when the position is filled. The role of the team is to develop, implement, maintain, and revise, as necessary, the SWPPP for the facility.

2. Description of the facility and identification of potential pollutant sources

The SWPPP shall include a map of the facility and a description of the activities that occur at the facility. The map shall show the location of the stormwater outfalls, receiving waters, and any structural controls. Identify all activities that occur at the facility and the potential pollutants associated with each activity including the location of any floor drains. These may be included as part of the inventory required by part 2.3.7.a.

3. Identification of stormwater controls

The permittee shall select, design, install, and implement the control measures detailed in paragraph 4 below to prevent or reduce the discharge of pollutants from the permittee owned facility.

The selection, design, installation, and implementation of the control measures shall be in accordance with good engineering practices and manufacturer's specifications. The permittee shall also take all reasonable steps to control or address the quality of discharges from the site that may not originate at the facility.

If the discharge from the facility is to a water quality limited water and the facility has the potential to discharge the pollutant identified as causing the water quality limitation, the permittee shall identify the control measures that will be used to address this pollutant at the facility so that the discharge does not cause or contribute to a violation of a water quality standard.

4. The SWPPP shall include the following management practices:

- a) Minimize or Prevent Exposure: The permittee shall to the extent practicable either locate materials and activities inside, or protect them with storm-resistant coverings in order to prevent exposure to rain, snow, snowmelt and runoff (although significant enlargement of impervious surface area is not recommended). Materials do not need to be enclosed or covered if stormwater runoff from affected areas will not be discharged directly or indirectly to surface waters or to the MS4 or if discharges are authorized under another NPDES permit.
- b) Good Housekeeping: The permittee shall keep clean all exposed areas that are potential sources of pollutants, using such measures as sweeping at regular intervals. Ensure that trash containers are closed when not in use, keep storage areas well swept and free from leaking or damaged containers; and store leaking vehicles needing repair indoors.

- c) Preventative Maintenance: The permittee shall regularly inspect, test, maintain, and repair all equipment and systems to avoid situations that may result in leaks, spills, and other releases of pollutants in stormwater to receiving waters. Inspections shall occur at a minimum once per quarter.
- d) Spill Prevention and Response: The permittee shall minimize the potential for leaks, spills, and other releases that may be exposed to stormwater and develop plans for effective response to such spills if or when they occur. At a minimum, the permittee shall have procedures that include:
- Preventive measures such as barriers between material storage and traffic areas, secondary containment provisions, and procedures for material storage and handling.
  - Response procedures that include notification of appropriate facility personnel, emergency agencies, and regulatory agencies, and procedures for stopping, containing, and cleaning up leaks, spills and other releases. Measures for cleaning up hazardous material spills or leaks shall be consistent with applicable Resource Conservation and Recovery Act (RCRA) regulations at 40 CFR section 264 and 40 CFR section 265. Employees who may cause, detect, or respond to a spill or leak shall be trained in these procedures and have necessary spill response equipment available. If possible, one of these individuals should be a member of the Pollution Prevention Team; and
  - Contact information for individuals and agencies that shall be notified in the event of a leak, spill, or other release. Where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under 40 CFR section 110, 40 CFR section 117, or 40 CFR section 302, occurs during a 24-hour period, the permittee shall notify the National Response Center (NRC) at (800) 424-8802 in accordance with the requirements of 40 CFR section 110, 40 CFR section 117, and 40 CFR section 302 as soon as the permittee has knowledge of the discharge. State or local requirements may necessitate reporting spills or discharges to local emergency, public health or drinking water supply agencies, and owners of public drinking water supplies. Contact information shall be in locations that are readily accessible and available.
- e) Erosion and Sediment Control: The permittee shall use structural and non-structural control measures at the facility to stabilize and contain runoff from exposed areas and to minimize or eliminate onsite erosion and sedimentation. Efforts to achieve this may include the use of flow velocity dissipation devices at discharge locations and within outfall channels where necessary to reduce erosion.

- f) Management of Runoff: The permittee shall manage stormwater runoff from the facility to prevent or reduce the discharge of pollutants. This may include management practices which divert runoff from areas that are potential sources of pollutants, contain runoff in such areas, or reuse, infiltrate or treat stormwater to reduce the discharge of pollutants.
- g) Salt Storage Piles or Piles Containing Salt: For storage piles of salt or piles containing salt used for deicing or other purposes (including maintenance of paved surfaces) for which the discharge during precipitation events discharges to the permittee's MS4, any other storm sewer system, or to a Water of the US, the permittee shall prevent exposure of the storage pile to precipitation by enclosing or covering the storage piles. Such piles shall be enclosed or covered within two (2) years of the permit effective date. The permittee shall implement appropriate measures (e.g., good housekeeping, diversions, containment) to minimize exposure resulting from adding to or removing materials from the pile. The permittee is encouraged to store piles in such a manner as not to impact surface water resources, ground water resources, recharge areas, and wells.
- h) Employee Training: The permittee shall regularly train employees who work in areas where materials or activities are exposed to stormwater, or who are responsible for implementing activities identified in the SWPPP (e.g., inspectors, maintenance personnel), including all members of the Pollution Prevention Team. Training shall cover both the specific components and scope of the SWPPP and the control measures required under this part, including spill response, good housekeeping, material management practices, any best management practice operation and maintenance, etc. EPA recommends annual training.

The permittee shall document the following information for each training:

- The training date, title and training duration;
  - List of municipal attendees;
  - Subjects covered during training
- i) Maintenance of Control Measures: The permittee shall maintain all control measures, required by this permit in effective operating condition. The permittee shall keep documentation onsite that describes procedures and a regular schedule for preventative maintenance of all control measures and discussions of back-up practices in place should a runoff event occur while a control measure is off-line. Nonstructural control measures shall also be diligently maintained (e.g., spill response supplies available, personnel trained).

iii. The permittee shall conduct the following inspections:

- 1. Site Inspections: Inspect all areas that are exposed to stormwater and all stormwater control measures. Inspections shall be conducted at least once each calendar quarter. More frequent inspections may be required if significant activities are exposed to stormwater. Inspections shall be performed when the

facility is in operation. At least one of the quarterly inspections shall occur during a period when a stormwater discharge is occurring.

The permittee shall document the following information for each facility inspection:

- The inspection date and time;
- The name of the inspector;
- Weather information and a description of any discharge occurring at the time of the inspection;
- Identification of any previously unidentified discharges from the site;
- Any control measures needing maintenance or repair;
- Any failed control measures that need replacement.
- Any SWPPP changes required as a result of the inspection.

If during the inspections, or any other time, the permittee identifies control measures that need repair or are not operating effectively, the permittee shall repair or replace them before the next anticipated storm event if possible, or as soon as practicable following that storm event. In the interim, the permittee shall have back-up measures in place.

The permittee shall report the findings from the Site Inspections in the annual report.

- iv. The permittee must keep a written (hardcopy or electronic) record of all required activities including but not limited to maintenance, inspections, and training required by part 2.3.7.b. The permittee shall maintain all records associated with the development and implementation of the SWPPP required by this part consistent with the requirements of part 4.2.

### **3.0. Additional Requirements for Discharges to Surface Drinking Water Supplies and Their Tributaries**

- a. Permittees which discharge to public surface drinking water supply sources (Class A and Class B surface waters used for drinking water) or their tributaries should consider these waters a priority in the implementation of the SWMP.
- b. Permittees should provide pretreatment and spill control measures to stormwater discharges to public drinking water supply sources or their tributaries to the extent feasible.
- c. Direct discharges to Class A waters should be avoided to the extent feasible.

### **4.0. Program Evaluation, Record Keeping, and Reporting**

#### **4.1. Program Evaluation**

- a. The permittee shall annually self-evaluate its compliance with the terms and conditions of this permit and submit each self-evaluation in the Annual Report. The permittee shall also maintain the annual evaluation documentation as part of the SWMP.

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b. The permittee shall evaluate the appropriateness of the selected BMPs in achieving the objectives of each control measure and the defined measurable goals. Where a BMP is found to be ineffective the permittee shall change BMPs in accordance with the provisions below. In addition, permittees may augment or change BMPs at any time following the provisions below:

- Changes adding (but not subtracting or replacing) components or controls may be made at any time.
- Changes replacing an ineffective or infeasible BMP specifically identified in the SWMP with an alternative BMP may be made as long as the basis for the changes is documented in the SWMP by, at a minimum:
  - An analysis of why the BMP is ineffective or infeasible;
  - Expectations on the effectiveness of the replacement BMP; and
  - An analysis of why the replacement BMP is expected to achieve the defined goals of the BMP to be replaced.

The permittee shall indicate BMP modifications along with a brief explanation of the modification in each Annual Report.

c. EPA or MassDEP may require the permittee to add, modify, repair, replace or change BMPs or other measures described in the annual reports as needed:

- To address impacts to receiving water quality caused or contributed to by discharges from the MS4; or
- To satisfy conditions of this permit

Any changes requested by EPA or MassDEP will be in writing and will set forth the schedule for the permittee to develop the changes and will offer the permittee the opportunity to propose alternative program changes to meet the objective of the requested modification.

### 4.2. Record Keeping

- a. The permittee shall keep all records required by this permit for a period of at least five years. EPA may extend this period at any time. Records include information used in the development of any written (hardcopy or electronic) program required by this permit, any monitoring results, copies of reports, records of screening, follow-up and elimination of illicit discharges; maintenance records; inspection records; and data used in the development of the notice of intent, SWMP, SWPPP, and annual reports. This list provides examples of records that should be maintained, but is not all inclusive.
- b. Records other than those required to be included in the annual report, part 4.4, shall be submitted only when requested by the EPA or the MassDEP.
- c. The permittee shall make the records relating to this permit, including the written (hardcopy or electronic) stormwater management program, available to the public. The public may view the records during normal business hours. The permittee may charge a reasonable fee for copying requests. The permittee is encouraged to satisfy this requirement by posting records online.

### 4.3. Outfall Monitoring Reporting

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- a. The permittee shall monitor and sample its outfalls at a minimum through sampling and testing at the frequency and locations required in connection with IDDE screening under part 2.3.4.7.b. and 2.3.4.8.c.ii.2. The monitoring program may also include additional outfall and interconnection monitoring as determined by the permittee in connection with assessment of SWMP effectiveness pursuant to part 4.1; evaluation of discharges to water quality limited waters pursuant to part 2.2; assessment of BMP effectiveness pursuant to part 2.2 or 2.3; or otherwise.
- b. The permittee shall document all monitoring results each year in the annual report. The report shall include the date, outfall or interconnection identifier, location, weather conditions at time of sampling, precipitation in previous 48 hours, field screening parameter results, and results of all analyses. The annual report shall include all of this information and data for the current reporting period and for the entire permit period.
- c. The permittee shall also include in the annual report results from any other stormwater or receiving water quality monitoring or studies conducted during the reporting period where that data is being used by the permittee to inform permit compliance or program effectiveness. If such monitoring or studies were conducted on behalf of the permittee, or if monitoring or studies conducted by other entities were reported to the permittee, a brief description of the type of information gathered or received shall be included in the annual report(s) covering the time period(s) the information was received.

### 4.4. Annual Reports

- a. The permittee shall submit annual reports each year of the permit term. 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 this permit shall also cover the period from May 1, [year of final permit effective date] to the permit effective date. The annual report is due ninety days from the close of each reporting period.
- b. 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:

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- 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.
- c. Reports shall be submitted to EPA at the following address:

United State Environmental Protection Agency  
Stormwater and Construction Permits Section (OEP06-1)  
Five Post Office Square, Suite 100  
Boston, MA 02109

Massachusetts Department of Environmental Protection  
One Winter Street – 5th Floor  
Boston, MA 02108  
ATTN: Frederick Civian

Or submitted electronically to EPA at the following email address: [stormwater.reports@epa.gov](mailto:stormwater.reports@epa.gov). After December 21, 2020 all Annual Reports must be submitted electronically.

## **5.0. Non-Traditional MS4s**

Non-traditional MS4s are MS4s owned and operated by the Commonwealth of Massachusetts, counties or other public agencies within the Commonwealth of Massachusetts, and properties owned and operated by the United States (Federal Facilities) within the Commonwealth of Massachusetts. This part addresses all non-traditional MS4s except MS4s that are owned or operated by transportation agencies, which are addressed in part 6.0 below.

### **5.1. Requirements for Non-Traditional MS4s**

All requirements and conditions of parts 1 – 4 above apply to all Non-traditional MS4s, except as specifically provided below:

#### **5.1.1. Public education**

For the purpose of this permit, the audiences for a Non-traditional MS4 include the employees, clients and customers (including students at education MS4s), visitors to the property, tenants, long term contractors and any other contractors working at the facility where the MS4 is located. The permittee may use some of the educational topics included in part 2.3.2.d. as appropriate, or may focus on topics specific to the MS4. The permittee shall document the educational topics for each target audience in the SWMP and annual reports.

#### **5.1.2. Ordinances and regulatory mechanisms**

Some Non-traditional MS4s may not have authority to enact an ordinance, by-law, or other regulatory mechanisms. MS4s without the authority to enact an ordinance shall ensure that written policies or procedures are in place to address the requirements of part 2.3.4.5., part 2.3.4.6 and part 2.3.6.a.

#### **5.1.3. Assessment of Regulations**

Non-traditional MS4s do not need to meet the requirements of part 2.3.6.c.

#### **5.1.4. New Dischargers**

New MS4 facilities are subject to additional water quality-based requirements if they fall within the definition of “new discharger” under 40 CFR § 122.2: “A new discharger is any building, structure, facility or installation (a) from which there is or may be a ‘discharge of pollutants’ (b) that did not commence the ‘discharge of pollutants’ at a particular ‘site’ prior to August 13, 1979; (c) which is not a ‘new source’; and (d) which never received a finally effective NPDES permit for discharges at that ‘site.’ The term “site” is defined in § 122.2 to mean “the land or water area where any ‘facility or activity’ is physically located or conducted including adjacent land used in connection with the facility or activity.”

Consistent with these definitions, a Non-traditional MS4 is a “new discharger” if it discharges stormwater from a new facility with an entirely new separate storm sewer system that is not

physically located on the same or adjacent land as an existing facility and associated system operated by the same MS4.

Any Non-traditional MS4 facility that is a “new discharger” and discharges to a waterbody listed in category 5 or 4b on the Massachusetts Integrated Report of waters listed pursuant to Clean Water Act section 303(d) and 305(b) due to nutrients (Total Nitrogen or Total Phosphorus), metals (Cadmium, Copper, Iron, Lead or Zinc), solids (TSS or Turbidity), bacteria/pathogens (E. Coli, Enterococcus or Fecal Coliform), chloride (Chloride) or oil and grease (Petroleum Hydrocarbons or Oil and Grease), or discharges to a waterbody with an approved TMDL for any of those pollutants, is not eligible for coverage under this permit and shall apply for an individual permit.

Any Non-traditional MS4 facility that is a “new discharger” and discharges to a waterbody that is in attainment is subject to Massachusetts antidegradation regulations at 314 CMR 4.04. The permittee shall comply with the provisions of 314 CMR 4.04 including information submittal requirements and obtaining authorization for new discharges where appropriate<sup>16</sup>. Any authorization of new discharges by MassDEP shall be incorporated into the permittee's SWMP. If an applicable MassDEP approval specifies additional conditions or requirements, then those requirements are incorporated into this permit by reference. The permittee must comply with all such requirements.

## **6.0 Requirements for MS4s Owned or Operated by Transportation Agencies**

This part applies to all MS4s owned or operated by any state or federal transportation agency (except Massachusetts Department of Transportation –MassDOT- Highway Division, which is subject to a separate individual permit). All requirements and conditions of this permit apply with the following exceptions:

### **6.1 Public education**

For the purpose of this permit, the audiences for a transportation agency education program include the general public (users of the roadways), employees, and any contractors working at the location. The permittee may use some of the educational topics included in part 2.3.2.d. as appropriate, or may focus on topics specific to the agency. The permittee shall document the educational topics for each target audience.

### **6.2 Ordinances and regulatory mechanisms**

The transportation agency may not have authority to enact an ordinance, by-law or other regulatory mechanisms. The agency shall ensure that written agency policies or procedures are in place to address the requirements of part 2.3.4.5., part 2.3.4.6 and part 2.3.6.a.

### **6.3 Assessment of regulations**

Non-traditional MS4s do not need to meet the requirements of part 2.3.6.c.

### **6.4 New Dischargers**

New MS4 facilities are subject to additional water quality-based requirements if they fall within the definition of “new dischargers” under 40 CFR § 122.2: “A new discharger is any building, structure, facility or installation (a) from which there is or may be a ‘discharge of pollutants’ (b) that did not commence the ‘discharge of pollutants’ at a particular ‘site’ prior to August 13, 1979; (c) which is not a ‘new source’; and (d) which never received a finally effective NPDES permit for discharges at that ‘site.’ The term “site” is defined

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<sup>16</sup> Contact MassDEP for guidance on compliance with 314 CMR 4.04

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in § 122.2 to mean "the land or water area where any 'facility or activity' is physically located or conducted including adjacent land used in connection with the facility or activity."

Consistent with these definitions, a new transportation MS4 is a "new discharger" if it discharges stormwater from a new facility with an entirely new separate storm sewer system that is not physically located on the same or adjacent land as an existing facility and associated system operated by the same MS4.

Any transportation MS4 facility that is a "new discharger" and discharges to a waterbody listed as impaired in category 5 or 4b on the Massachusetts Integrated Report of waters listed pursuant to Clean Water Act section 303(d) and 305(b) due to nutrients (Total Nitrogen or Total Phosphorus), metals (Cadmium, Copper, Iron, Lead or Zinc), solids (TSS or Turbidity), bacteria/pathogens (E. Coli, Enterococcus or Fecal Coliform), chloride (Chloride) or oil and grease (Petroleum Hydrocarbons or Oil and Grease), or discharges to a waterbody with an approved TMDL for any of those pollutants, is not eligible for coverage under this permit and shall apply for an individual permit.

Any transportation MS4 facility that is a "new discharger" and discharges to a waterbody that is in attainment is subject to Massachusetts antidegradation regulations at 314 CMR 4.04. The permittee shall comply with the provisions of 314 CMR 4.04 including information submittal requirements and obtaining authorization for new discharges where appropriate<sup>17</sup>. Any authorization of new discharges by MassDEP shall be incorporated into the permittee's SWMP. If an applicable MassDEP approval specifies additional conditions or requirements, then those requirements are incorporated into this permit by reference. The permittee must comply with all such requirements.

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<sup>17</sup> Contact MassDEP for guidance on compliance with 314 CMR 4.04

## **Appendix A**

### **Definitions, Abbreviations and Acronyms**

#### **Definitions**

**Best Management Practices (BMPs)** - schedules of activities, practices (and prohibitions of practices), structures, vegetation, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

**Common Plan of Development** - A "larger common plan of development or sale" is a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan. For example, if a developer buys a 20-acre lot and builds roads, installs pipes, and runs electricity with the intention of constructing homes or other structures sometime in the future, this would be considered a larger common plan of development or sale. If the land is parceled off or sold, and construction occurs on plots that are less than one acre by separate, independent builders, this activity still would be subject to stormwater permitting requirements if the smaller plots were included on the original site plan.

**Control Measure** - refers to any BMP or other method (including effluent limitations) used to prevent or reduce the discharge of pollutants to waters of the United States.

**Director** - a Regional Administrator of the Environmental Protection Agency or an authorized representative.

**Discharge** - when used without qualification, means the "discharge of a pollutant."

**Discharge of a pollutant** - any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source," or any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation. This includes additions of pollutants into waters of the United States from surface runoff which is collected or channeled by man; or discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works.

**Discharge-related activities** - activities which cause, contribute to, or result in stormwater and allowable non-stormwater point source discharges, and measures such as the siting, construction and operation of BMPs to control, reduce, or prevent pollution in the discharges.

**Disturbance** - action to alter the existing vegetation and/or underlying soil of a site, such as clearing, grading, site preparation (e.g., excavating, cutting, and filling), soil compaction, and movement and stockpiling of top soils.

**Existing Discharger** – an operator applying for coverage under this permit for discharges covered previously under an NPDES general or individual permit.

**Facility or Activity** - any NPDES “point source” or any other facility or activity (including land or appurtenances thereto) that is subject to regulation under the NPDES program.

**Federal Facility** – Any buildings, installations, structures, land, public works, equipment, aircraft, vessels, and other vehicles and property, owned by, or constructed or manufactured for the purpose of leasing to, the federal government.

**Illicit Discharge** - any discharge to a municipal separate storm sewer that is not composed entirely of stormwater except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.

**Impaired Water** – A water is impaired if it does not meet one or more of its designated use(s). For purposes of this permit, “impaired” refers to categories 4 and 5 of the five-part categorization approach used for classifying the water quality standards attainment status for water segments under the TMDL program. Impaired waters compilations are also sometimes referred to as “303(d) lists.” Category 5 waters are impaired because at least one designated use is not being supported or is threatened and a TMDL is needed. Category 4 waters indicate that at least one designated use is not being supported but a TMDL is not needed (4a indicates that a TMDL has been approved or established by EPA; 4b indicates other required control measures are expected in result in the attainment of water quality standards in a reasonable period of time; and 4c indicates that the non-attainment of the water quality standard is the result of pollution (e.g. habitat) and is not caused by a pollutant). See *USEPA’s 2006 Integrated Report Guidance, July 29, 2005* for more detail on the five part categorization of waters [under EPA National TMDL Guidance <http://www.epa.gov/owow/tmdl/policy.html>]).

**Impervious Surface**- Any surface that prevents or significantly impedes the infiltration of water into the underlying soil. This can include but is not limited to: roads, driveways, parking areas and other areas created using non porous material; buildings, rooftops, structures, artificial turf and compacted gravel or soil.

**Industrial Activity** - the ten categories of industrial activities included in the definition of “stormwater discharges associated with industrial activity,” as defined in 40 CFR 122.26(b)(14)(i)-(ix) and (xi).

**Industrial Stormwater** - stormwater runoff associated with the definition of “stormwater discharges associated with industrial activity.”

**Interconnection** – the point (excluding sheet flow over impervious surfaces) where the permittee’s MS4 discharges to another MS4 or other storm sewer system, through which the discharge is eventually conveyed to a water of the United States. Interconnections shall be treated similarly to outfalls throughout the permit.

**Junction Manhole** - For the purposes of this permit, a junction manhole is a manhole or structure with two or more inlets accepting flow from two or more MS4 alignments. Manholes with inlets solely from private storm drains, individual catch basins, or both are not considered junction manholes for these purposes.

**Key Junction Manhole** - For the purposes of this permit, key junction manholes are those junction manholes that can represent one or more junction manholes without compromising adequate implementation of the illicit discharge program. Adequate implementation of the illicit discharge program would not be compromised if the exclusion of a particular junction manhole as a key junction manhole would not affect the permittee's ability to determine the possible presence of an upstream illicit discharge. A permittee may exclude a junction manhole located upstream from another located in the immediate vicinity or that is serving a drainage alignment with no potential for illicit connections.

**Municipal Separate Storm Sewer** - a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

- (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;
- (ii) Designed or used for collecting or conveying stormwater;
- (iii) Which is not a combined sewer; and
- (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

**Municipal Separate Storm Sewer System (MS4)** - means all separate storm sewers that are defined as "large" or "medium" or "small" municipal storm sewer systems pursuant to paragraphs 40 CFR 122.26 (b)(4) and (b)(7), or designated under paragraph 40 126.26(a) (1)(v). For the purposes of this permit "MS4" may also refer to the permittee with jurisdiction over the sewer system.

**New Development** – any construction activities or land alteration resulting in total earth disturbances greater than 1 acre (or activities that are part of a larger common plan of development disturbing greater than 1 acre) on an area that has not previously been developed to include impervious cover. (see part 2.3.6. of the permit)

**New Discharger** – For the purposes of this permit, a new discharger is an entity that discharges stormwater from a new facility with an entirely new separate storm sewer system that is not physically located on the same or adjacent land as an existing facility and associated system operated by the same MS4.

**New Source** - any building, structure, facility, or installation from which there is or may be a “discharge of pollutants,” the construction of which commenced:

- S after promulgation of standards of performance under section 306 of the CWA which are applicable to such source, or
- S after proposal of standards of performance in accordance with section 306 of the CWA which are applicable to such source, but only if the standards are promulgated in accordance with section 306 within 120 days of their proposal.

**New Source Performance Standards (NSPS)** – Technology-based standards for facilities that qualify as new sources under 40 CFR 122.2 and 40 CFR 122.29.

**No exposure** - all industrial materials or activities are protected by a storm-resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff.

**One Lane Width** – The width of the travel lane for a roadway. Lane width does not include shoulders, curbs, and on-street parking areas.

**Outfall Catchment** – The land area draining to a single outfall or interconnection. The extent of an outfall’s catchment is determined not only by localized topography and impervious cover but also by the location of drainage structures and the connectivity of MS4 pipes.

**Owner or operator** - the owner or operator of any “facility or activity” subject to regulation under the NPDES program.

**Person** - an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof.

**Point source** - any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.

**Pollutant** - dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal and agricultural waste discharged into water.

**Pollutant of concern** – A pollutant which causes or contributes to a violation of a water quality standard, including a pollutant which is identified as causing an impairment in a State's 303(d) list.

**Redevelopment** – for the purposes of part 2.3.6., any construction, land alteration, or improvement of impervious surfaces resulting in total earth disturbances greater than 1

acre (or activities that are part of a larger common plan of development disturbing greater than 1 acre) that does not meet the definition of new development (see above).

**Reportable Quantity Release** – a release of a hazardous substance at or above the established legal threshold that requires emergency notification. Refer to 40 CFR Parts 110, 177, and 302 for complete definitions and reportable quantities for which notification is required.

**Runoff coefficient** - the fraction of total rainfall that will appear at the conveyance as runoff.

**Significant materials** - includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under section 101(14) of CERCLA; any chemical the facility is required to report pursuant to section 313 of Title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with stormwater discharges.

**Site** – for the purposes of part 2.3.6., the area extent of construction activities, including but not limited to the creation of new impervious cover and improvement of existing impervious cover (e.g. repaving not covered by 2.3.6.a.ii.4.d.)

**Small Municipal Separate Storm Sewer System** – all separate storm sewer systems that are (i) owned or operated by the United States, a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district, or drainage district, or similar entity or an Indian tribe or an authorized Indian tribal organization or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States, and (ii) not defined as “large” or “medium” municipal separate storm sewer system pursuant to paragraphs 40 CFR 122.26 (b)(4) and (b)(7), or designated under paragraph 40 126.26(a) (1)(v). This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. This term does not include separate storm sewers in very discrete areas, such as individual buildings.

**Small MS4** – means a small municipal separate storm sewer system.

**Stormwater** - stormwater runoff, snow melt runoff, and surface runoff and drainage.

**Stormwater Discharges Associated with Construction Activity** - a discharge of pollutants in stormwater runoff from areas where soil disturbing activities (e.g., clearing, grading, or excavating), construction materials, or equipment storage or maintenance (e.g., fill piles, borrow areas, concrete truck washout, fueling), or other industrial

stormwater directly related to the construction process (e.g., concrete or asphalt batch plants) are located. (See 40 CFR 122.26(b)(14)(x) and 40 CFR 122.26(b)(15).

**Stormwater Discharges Associated with Industrial Activity** - the discharge from any conveyance that is used for collecting and conveying stormwater and that is directly related to manufacturing, processing or raw materials storage areas at an industrial plant. The term does not include discharges from facilities or activities excluded from the NPDES program under Part 122. For the categories of industries identified in this section, the term includes, but is not limited to, stormwater discharges from industrial plant yards; immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility; material handling sites; refuse sites; sites used for the application or disposal of process waste waters (as defined at part 401 of this chapter); sites used for the storage and maintenance of material handling equipment; sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials, and intermediate and final products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to stormwater. For the purposes of this paragraph, material handling activities include storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product, by-product or waste product. The term excludes areas located on plant lands separate from the plant's industrial activities, such as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with stormwater drained from the above described areas. Industrial facilities include those that are federally, State, or municipally owned or operated that meet the description of the facilities listed in Appendix D of this permit. The term also includes those facilities designated under the provisions of 40 CFR 122.26(a)(1)(v).

**Total Maximum Daily Loads (TMDLs)** - A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. A TMDL includes wasteload allocations (WLAs) for point source discharges, load allocations (LAs) for nonpoint sources and/or natural background, and must include a margin of safety (MOS) and account for seasonal variations. (See section 303(d) of the Clean Water Act and 40 CFR 130.2 and 130.7).

**Urbanized Area** – US Census designated area comprised of a densely settled core of census tracts and/or census blocks that meet minimum population density requirements, along with adjacent territory containing non-residential urban land uses as well as territory with low population density included to link outlying densely settled territory with the densely settled core. For the purposes of this permit, Urbanized Areas as defined by any Census since 2000 remain subject to stormwater regulation even if there is a change in the reach of the Urbanized Area because of a change in more recent Census data.

**Water Quality Limited Water** – for the purposes of this permit, a water quality limited water is any waterbody that does not meet applicable water quality standards, including but not limited to waters listed in categories 5 or 4b on the Massachusetts Integrated Report of waters listed pursuant to Clean Water Act section 303(d) and 305(b).

**Water Quality Standards** - A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses. States and EPA adopt WQS to protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act (See CWA sections 101(a)2 and 303(c)).

#### **ABBREVIATIONS AND ACRONYMS**

BMP – Best Management Practice

BPJ – Best Professional Judgment

CGP – Construction General Permit

CWA – Clean Water Act (or the Federal Water Pollution Control Act, 33 U.S.C. §1251 *et seq*)

DCIA – Directly Connected Impervious Area

EPA – U. S. Environmental Protection Agency

ESA – Endangered Species Act

USFWS – U. S. Fish and Wildlife Service

IA – Impervious Area

IDDE – Illicit Discharge Detection and Elimination

LA – Load Allocations

MOS – Margin of Safety

MS4 – Municipal Separate Storm Sewer System

MSGP – Multi-Sector General Permit

NHPA – National Historic Preservation Act

NMFS – U. S. National Marine Fisheries Service

NOI – Notice of Intent

NPDES – National Pollutant Discharge Elimination System

NRHP – National Register of Historic Places

NSPS – New Source Performance Standard

NTU – Nephelometric Turbidity Unit

PCP – Phosphorus Control Plan (pertaining to Charles River Watershed phosphorus

TMDL requirements only – Appendix F Part A.I)

LPCP – Lake Phosphorus Control Plan (pertaining to Lake or pond phosphorus TMDL

requirements only – Appendix F Part A.II)

POTW – Publicly Owned Treatment Works

RCRA – Resource Conservation and Recovery Act

SHPO – State Historic Preservation Officer

SIC – Standard Industrial Classification

SPCC – Spill Prevention, Control, and Countermeasure

SWMP – Stormwater Management Program

SWPPP – Stormwater Pollution Prevention Plan

TMDL – Total Maximum Daily Load

TSS – Total Suspended Solids

USGS – United States Geological Survey

WLA – Wasteload Allocation

WQS – Water Quality Standard

## Appendix B

### Standard Permit Conditions

#### Standard Permit Conditions

Standard permit conditions in Appendix B are consistent with the general permit provisions required under 40 CFR 122.41.

#### B.1. Duty To Comply

You must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

- A. You must comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
- B. Penalties for Violations of Permit Conditions: The Director will adjust the civil and administrative penalties listed below in accordance with the Civil Monetary Penalty Inflation Adjustment Rule (61 FR 252, December 31, 1996, pp. 69359-69366, as corrected in 62 FR 54, March 20, 1997, pp.13514-13517) as mandated by the Debt Collection Improvement Act of 1996 for inflation on a periodic basis. This rule allows EPA's penalties to keep pace with inflation. The Agency is required to review its penalties at least once every 4 years thereafter and to adjust them as necessary for inflation according to a specified formula. The civil and administrative penalties following were adjusted for inflation starting in 1996.
  1. *Criminal Penalties.*
    - a. *Negligent Violations.* The CWA provides that any person who negligently violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to criminal penalties of \$2,500 to \$25,000 per day of violation, or imprisonment of not more than one year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than \$50,000 per day of violation or by imprisonment of not more than two years, or both.
    - b. *Knowing Violations.* The CWA provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a fine of not less than \$5,000 nor more than \$50,000 per day of violation, or by imprisonment for not more than 3 years, or both. In the case of a

second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than \$100,000 per day of violation, or imprisonment of not more than 6 years, or both.

- c. *Knowing Endangerment.* The CWA provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act and who knows at that time that he or she is placing another person in imminent danger of death or serious bodily injury shall upon conviction be subject to a fine of not more than \$250,000 or by imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than \$500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the Act, shall, upon conviction of violating the imminent danger provision be subject to a fine of not more than \$1,000,000 and can fined up to \$2,000,000 for second or subsequent convictions.
  - d. *False Statement.* The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than 4 years, or both. The Act further provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.
2. *Civil Penalties.* The CWA provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a civil penalty not to exceed the maximum amounts authorized by Section 309(d) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. § 3701 note) (currently \$32,500 per day for each violation).
  3. *Administrative Penalties.* The CWA provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to an administrative penalty, as follows:

- 3.1. *Class I Penalty.* Not to exceed the maximum amounts authorized by Section 309(g)(2)(A) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. § 3701 note) (currently \$11,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed \$32,500).
- 3.2. *Class II Penalty.* Not to exceed the maximum amounts authorized by Section 309(g)(2)(B) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. § 3701 note) (currently \$11,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed \$157,500).

## **B.2. Duty to Reapply**

If you wish to continue an activity regulated by this permit after the expiration date of this permit, you must apply for and obtain a new permit.

## **B.3. Need to Halt or Reduce Activity Not a Defense**

It shall not be a defense for you in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

## **B.4. Duty to Mitigate**

You must take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

## **B.5. Proper Operation and Maintenance**

You must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by you to achieve compliance with the conditions of this permit, including the requirements of your SWPPP. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed by you only when the operation is necessary to achieve compliance with the conditions of this permit.

## **B.6. Permit Actions**

This permit may be modified, revoked and reissued, or terminated for cause. Your filing of a request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

**B.7. Property Rights**

This permit does not convey any property rights of any sort, or any exclusive privileges.

**B.8. Duty to Provide Information**

You must furnish to EPA or an authorized representative (including an authorized contractor acting as a representative of EPA), within a reasonable time, any information which EPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. You must also furnish to EPA upon request, copies of records required to be kept by this permit.

**B.9. Inspection and Entry**

You must allow EPA or an authorized representative (including an authorized contractor acting as a representative of EPA), upon presentation of credentials and other documents as may be required by law, to:

- A. Enter upon your premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
- B. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
- C. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
- D. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

**B.10. Monitoring and Records**

- A. Samples and measurements taken for the purpose of monitoring must be representative of the volume and nature of the monitored activity.
- B. You must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of EPA at any time.
- C. Records of monitoring information must include:
  1. The date, exact place, and time of sampling or measurements;
  2. The individual(s) who performed the sampling or measurements;
  3. The date(s) analyses were performed

4. The individual(s) who performed the analyses;
  5. The analytical techniques or methods used; and
  6. The results of such analyses.
- D. Monitoring results must be conducted according to test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, unless other test procedures have been specified in the permit.
- E. The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

### **B.11. Signatory Requirements**

- A. All applications, including NOIs, must be signed as follows:
1. For a corporation: By a responsible corporate officer. For the purpose of this subsection, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
  2. For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or
  3. For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this subsection, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

- B. 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 above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
1. The authorization is made in writing by a person described in Appendix B, Subsection 11.A;
  2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
  3. The signed and dated written authorization is included in the SWPPP. A copy must be submitted to EPA, if requested.
- C. Changes to Authorization. If an authorization under Appendix B, Subsection 11.B is no longer accurate because a different operator has responsibility for the overall operation of the industrial facility, a new NOI satisfying the requirements of Subsection 11.B must be submitted to EPA prior to or together with any reports, information, or applications to be signed by an authorized representative.
- D. Any person signing documents required under the terms of this permit must include the following 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 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.”
- E. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

**B.12. Reporting Requirements**

- A. Planned changes. You must give notice to EPA as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:
1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR §122.29(b); or
  2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR §122.42(a)(1).
- B. Anticipated noncompliance. You must give advance notice to EPA of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
- C. Transfers. This permit is not transferable to any person except after notice to EPA. EPA may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Clean Water Act. (See 40 CFR §122.61; in some cases, modification or revocation and reissuance is mandatory.)
- D. Monitoring reports. Monitoring results must be reported at the intervals specified elsewhere in this permit.
1. Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms (paper or electronic) provided or specified by EPA for reporting results of monitoring of sludge use or disposal practices.
  2. If you monitor any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in the permit, the results of this monitoring must be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by EPA.
  3. Calculations for all limitations which require averaging of measurements must use an arithmetic mean and non-detected results must be incorporated in calculations as the limit of quantitation for the analysis.
- E. Compliance schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date.
- F. Twenty-four hour reporting.
1. You must report any noncompliance which may endanger health or the environment. Any information must be provided orally within 24 hours

from the time you become aware of the circumstances. A written submission must also be provided within five days of the time you become aware of the circumstances. The written submission must contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

2. The following shall be included as information which must be reported within 24 hours under this paragraph.
    - a. Any unanticipated bypass which exceeds any effluent limitation in the permit. (See 40 CFR §122.41(g).)
    - b. Any upset which exceeds any effluent limitation in the permit
    - c. Violation of a maximum daily discharge limitation for any of the pollutants listed by EPA in the permit to be reported within 24 hours. (See 40 CFR §122.44(g).)
  3. EPA may waive the written report on a case-by-case basis for reports under Appendix B, Subsection 12.F.2 if the oral report has been received within 24 hours.
- G. Other noncompliance. You must report all instances of noncompliance not reported under Appendix B, Subsections 12.D, 12.E, and 12.F, at the time monitoring reports are submitted. The reports must contain the information listed in Appendix B, Subsection 12.F.
- H. Other information. Where you become aware that you failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Permitting Authority, you must promptly submit such facts or information.

### **B.13. Bypass**

- A. Definitions.
1. Bypass means the intentional diversion of waste streams from any portion of a treatment facility
  2. Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
- B. Bypass not exceeding limitations. You may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential

maintenance to assure efficient operation. These bypasses are not subject to the provisions of Appendix B, Subsections 13.C and 13.D.

C. Notice.

1. Anticipated bypass. If you know in advance of the need for a bypass, you must submit prior notice, if possible at least ten days before the date of the bypass.
2. Unanticipated bypass. You must submit notice of an unanticipated bypass as required in Appendix B, Subsection 12.F (24-hour notice).

D. Prohibition of bypass.

1. Bypass is prohibited, and EPA may take enforcement action against you for bypass, unless:
  - a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
  - b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
  - c. You submitted notices as required under Appendix B, Subsection 13.C.
2. EPA may approve an anticipated bypass, after considering its adverse effects, if EPA determines that it will meet the three conditions listed above in Appendix B, Subsection 13.D.1.

#### **B.14. Upset**

- A. Definition. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond your reasonable control. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
- B. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Appendix B, Subsection 14.C are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

- C. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
1. An upset occurred and that you can identify the cause(s) of the upset;
  2. The permitted facility was at the time being properly operated; and
  3. You submitted notice of the upset as required in Appendix B, Subsection 12.F.2.b (24 hour notice).
  4. You complied with any remedial measures required under Appendix B, Subsection 4.
- D. Burden of proof. In any enforcement proceeding, you, as the one seeking to establish the occurrence of an upset, has the burden of proof.

## 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<sup>1</sup>.

Applicants also have an independent ESA obligation to ensure that their activities do not result in any prohibited “take” of listed species<sup>2</sup>. 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 septentrionalis*), 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*

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<sup>1</sup> 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.

<sup>2</sup> 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?<sup>3</sup>
- 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:**

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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 met you may 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](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<sup>1</sup> 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 provide 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

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<sup>1</sup> 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.

## **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.**

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

## Part I: General Conditions

### General Information

Name of Municipality or Organization:  State

EPA NPDES Permit Number:

### Primary MS4 Program Manager Contact Information

Name:  Title:

Street Address Line 1

Street Address Line 2

City  State  Zip Code

Email:  Phone Number:

Fax Number:

### Other Information

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

Stormwater Management Program (SWMP) Location (web address or physical location):

### Eligibility Determination

Endangered Species Act (ESA) Determination Complete?  Eligibility Criteria (check all that apply):  A  B  C  D  E  F

National Historic Preservation Act (NHPA) Determination Complete?  Eligibility Criteria (check all that apply):  A  B  C  D

### MS4 Infrastructure (if covered under the 2003 permit)

Estimated Percent of Outfall Map Complete?  If 100% of 2003 requirements not met, enter an estimated date of completion (MM/DD/YY):

Web address where MS4 map is published:

*If outfall map is unavailable on the internet an electronic or paper copy of the outfall map must be included with NOI submission (see section V for submission options)*

### Regulatory Authorities (if covered under the 2003 permit)

Illicit Discharge Detection and Elimination (IDDE) Authority Adopted?:  Effective Date or Estimated Date of Adoption (MM/DD/YY):

Construction/Erosion and Sediment Control (ESC) Authority Adopted?:  Effective Date or Estimated Date of Adoption (MM/DD/YY):

Post- Construction Stormwater Management Adopted?:  Effective Date or Estimated Date of Adoption (MM/DD/YY):

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

### Part II: Summary of Receiving Waters

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

For Massachusetts list of impaired waters click here: [Massachusetts 2010 List of Impaired Waters](http://www.mass.gov/dep/water/resources/10list6.pdf) <http://www.mass.gov/dep/water/resources/10list6.pdf>

For New Hampshire list of impaired waters click here: [New Hampshire Final 303\(d\) Materials](http://des.nh.gov/organization/divisions/water/wmb/swqa/2010/index.htm): <http://des.nh.gov/organization/divisions/water/wmb/swqa/2010/index.htm>

Source of pollutants column should be completed with a preliminary source evaluation of pollutants for discharges to impaired waterbodies (see above 303(d) lists) without an approved TMDL in accordance with Section 2.2.2a of the permit

Waterbody segment that receives flow from the MS4	Number of outfalls into receiving water segment	Pollutant list (select one at a time to add)	Click impairment at left to add, or at right to remove	Pollutant(s) causing impairment, if applicable (select one at a time to remove)
		Chlorophyll-a Dissolved oxygen saturation Escherichia coli Mercury Nitrogen (Total) Oxygen, Dissolved	Add/Remove	
		Chlorophyll-a Dissolved oxygen saturation Escherichia coli Mercury Nitrogen (Total) Oxygen, Dissolved	Add/Remove	
		Chlorophyll-a Dissolved oxygen saturation Escherichia coli Mercury Nitrogen (Total) Oxygen, Dissolved	Add/Remove	
		Chlorophyll-a Dissolved oxygen saturation Escherichia coli Mercury Nitrogen (Total) Oxygen, Dissolved	Add/Remove	

		<p>Chlorophyll-a                  Dissolved oxygen saturation                  Escherichia coli                  Mercury                  Nitrogen (Total)                  Oxygen, Dissolved</p>	Add/Remove	
		<p>Chlorophyll-a                  Dissolved oxygen saturation                  Escherichia coli                  Mercury                  Nitrogen (Total)                  Oxygen, Dissolved</p>	Add/Remove	
		<p>Chlorophyll-a                  Dissolved oxygen saturation                  Escherichia coli                  Mercury                  Nitrogen (Total)                  Oxygen, Dissolved</p>	Add/Remove	
		<p>Chlorophyll-a                  Dissolved oxygen saturation                  Escherichia coli                  Mercury                  Nitrogen (Total)                  Oxygen, Dissolved</p>	Add/Remove	
		<p>Chlorophyll-a                  Dissolved oxygen saturation                  Escherichia coli                  Mercury                  Nitrogen (Total)                  Oxygen, Dissolved</p>	Add/Remove	
		<p>Chlorophyll-a                  Dissolved oxygen saturation                  Escherichia coli                  Mercury                  Nitrogen (Total)</p>	Add/Remove	

		Chlorophyll-a Dissolved oxygen saturation Escherichia coli Mercury Nitrogen (Total) Oxygen, Dissolved	Add/Remove	
		Chlorophyll-a Dissolved oxygen saturation Escherichia coli Mercury Nitrogen (Total) Oxygen, Dissolved	Add/Remove	
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		Chlorophyll-a Dissolved oxygen saturation Escherichia coli Mercury Nitrogen (Total) Oxygen, Dissolved	Add/Remove	

Click to lengthen table



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

## Part III: Stormwater Management Program Summary

### MCM 2: Public Involvement and Participation

BMP Categorization	Brief BMP Description (enter your own text to override the drop down menu)	Responsible Department/ Parties	Additional Description/ Measurable Goal	Beginning Year of BMP implement ation
Public Review	SWMP Review			
Public Participation				

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

### Part III: Stormwater Management Program Summary

#### MCM 3: Illicit Discharge Detection and Elimination (IDDE)

<b>BMP Categorization</b> (enter your own text to override the drop down menu)	<b>BMP Description</b>	<b>Responsible Department/Parties</b> (enter your own text to override the drop down menu)	<b>Measurable Goal</b> (all text can be overwritten)
SSO inventory			Develop SSO inventory within 1 year of effective date of permit
Storm sewer system map			Update map within 2 years of effective date of permit and complete full system map 10 years after effective date of permit
Written IDDE program development			Complete within 1.5 years of the effective date of permit
Implement IDDE Program			Implement catchment investigations according to program and permit conditions
Employee Training			Train annually
Conduct dry weather screening			Conduct in accordance with outfall screening procedure and permit conditions
Conduct wet weather screening			Conduct in accordance with outfall screening procedure and permit conditions
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# Notice of Intent (NOI) for coverage under Small MS4 General Permit (continued)

## Part III: Stormwater Management Program Summary

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

<b>BMP Categorization</b> (enter your own text to override the drop down menu or entered text)	<b>BMP Description</b>	<b>Responsible Department/ Parties</b> (enter your own text to override the drop down menu)	<b>Measurable Goal</b> (all text can be overwritten)	<b>Beginning Year of BMP implementation</b>
As-built plans for on-site stormwater control	The procedures to require submission of as-built drawings and ensure long term operation and maintenance will be a part of the SWMP.		Require submission of as-built plans for completed projects	
Inventory and priority ranking of MS4-owned properties that may be retrofitted with BMPs	Conduct detailed inventory of MS4 owned properties and rank for retrofit potential		Complete 4 years after permit effective date	
Allow green infrastructure	Develop a report assessing existing local regulations to determine the feasibility of making green infrastructure practices allowable when appropriate site conditions exist		Complete 4 years after permit effective date	
Street design 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.		Complete 4 years after permit effective date	
Ensure any stormwater controls or management practices for new development and redevelopment will prevent or minimize impacts to water quality.	Adoption, amendment or modification of a regulatory mechanism to meet permit requirements		Complete 2 years after permit effective date	



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

## Part III: Stormwater Management Program Summary

### MCM 6: Municipal Good Housekeeping and Pollution Prevention

<b>BMP Categorization</b> (enter your own text to override the drop down menu or entered text)	<b>BMP Description</b>	<b>Responsible Department/ Parties</b> (enter your own text to override the drop down menu)	<b>Measurable Goal</b> (all text can be overwritten)	<b>Beginning Year of BMP implementation</b>
Create written O&M procedures for parks and open spaces, buildings and facilities, and vehicles and equipment			Complete 2 years after permit effective date	
Inventory all permittee-owned parks and open spaces, buildings and facilities (including their storm drains), and vehicles and equipment			Complete 2 years after permit effective date	
Establish and implement program for repair and rehabilitation of MS4 infrastructure			Complete 2 years after permit effective date	
Stormwater Pollution Prevention Plan (SWPPP) for maintenance garages, transfer stations and other waste-handling facilities			Complete 2 years after permit effective date	
Catch Basin Cleaning				
Street Sweeping Program				
Road Salt use optimization program				
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# Notice of Intent (NOI) for coverage under Small MS4 General Permit (continued)

## Part IV: Notes and additional information

Use the space below to provide any additional information about your MS4 program

Click to add text

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

Title:

Signature Field

Date:

**NOI Submission**

Please submit the form electronically via email using the "submit by Email" button below or send in a CD with your completed NOI. You may also print and submit via mail at the address below if you choose not to submit electronically. Outfall map required in Part I of the NOI (if applicable) can be submitted electronically as an email attachment OR as a paper copy.

***Permittees that choose to submit their NOI electronically by email or by mailing a CD with the completed NOI form to EPA, will be able to download a partially filled Year 1 Annual Report at a later date from EPA.***

Submit by Email

Submit by email using this button. Or, send an email with attachments to: [stormwater.reports@epa.gov](mailto:stormwater.reports@epa.gov)

Save

Save NOI for your records

**EPA Submittal Address:**

United States Environmental Protection Agency  
5 Post Office Square - Suite 100  
Mail Code - OEP06-1  
Boston, Massachusetts 02109-3912  
ATTN: Newton Tedder

**State Submittal Address**

Massachusetts Department of Environmental Protection  
One Winter Street - 5th Floor  
Boston, MA 02108  
ATTN: Fred Civian

**APPENDIX F**  
Requirements for Discharges to Impaired Waters with an Approved TMDL

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Attachment 1 – Method To Calculate Baseline Watershed Phosphorus Load For Lake And Pond Phosphorus TMDLs (Applicable To part II Of Appendix F Only) And Method To Calculate Increases in Phosphorus Load due to Development

Attachment 2 – Phosphorus Reduction Credits For Selected Enhanced Non-Structural BMPs

Attachment 3 - Phosphorus Reduction Credits For Selected Structural BMPs

**A. Requirements for Discharges to Impaired Waters with an Approved MassDEP In State TMDL**

**I. Charles River Watershed Phosphorus TMDL Requirements**

On October 17, 2007, EPA approved the *Final TMDL for Nutrients in the Lower Charles River Basin* (Lower Charles TMDL)<sup>1</sup> and on June 10, 2011 EPA approved the *Total Maximum Daily Load for Nutrients in the Upper/Middle Charles River* (Upper/Middle Charles TMDL)<sup>2</sup>. The following phosphorus reduction requirements address phosphorus in MS4 discharges.

1. To address the discharge of phosphorus from its MS4, the permittee shall develop a Phosphorus Control Plan (PCP) designed to reduce the amount of phosphorus in stormwater (SW) discharges from its MS4 to the Charles River and its tributaries. The PCP shall be completed in phases and the permittee shall add it as an attachment to its written SWMP upon completion and report in annual reports pursuant to part 4.4 of the Permit on its progress toward achieving its Phosphorus Reduction Requirement. The PCP shall be developed and fully implemented as soon as possible but no later than 20 years after the permit effective date in accordance with the phases and schedule outlined below. Each Phase shall contain the elements required of each phase as described in parts a. through c below. The timing of each phase over 20 years from the permit effective date is:

1-5 years after permit effective date	5-10 years after permit effective date	10-15 years after permit effective date	15-20 years after permit effective date
Create Phase 1 Plan	Implement Phase 1 Plan		
	Create Phase 2 Plan	Implement Phase 2 Plan	
		Create Phase 3 Plan	Implement Phase 3 Plan

**a. Phase 1**

- 1) The permittee shall complete a written Phase 1 plan of the PCP five years after the permit effective date and fully implement the Phase 1 plan of the PCP as soon as possible but no longer than 10 years after the permit effective date.
- 2) The Phase 1 plan of the PCP shall contain the following elements and has the following required milestones:

Item Number	Phase 1 of the PCP Component and Milestones	Completion Date
1-1	Legal analysis	2 years after permit effective date

<sup>1</sup> Massachusetts Department of Environmental Protection. 2007. *Final TMDL for Nutrients in the Lower Charles River Basin*. CN 301.1

<sup>2</sup> Massachusetts Department of Environmental Protection. 2011. *Total Maximum Daily Load for Nutrients in the Upper/Middle Charles River Basin, Massachusetts*. CN 272.0

1-2	Funding source assessment.	3 years after permit effective date
1-3	Define scope of PCP (PCP Area) Baseline Phosphorus Load and Phosphorus Reduction Requirement and Allowable Phosphorus Load	4 years after permit effective date
1-4	Description of Phase 1 planned nonstructural controls	5 years after permit effective date
1-5	Description of Phase 1 planned structural controls	5 years after permit effective date
1-6	Description of Operation and Maintenance program for structural controls	5 years after permit effective date
1-7	Phase 1 implementation schedule	5 years after permit effective date
1-8	Estimated cost for implementing Phase 1 of the PCP	5 years after permit effective date
1-9	Complete Written Phase 1 PCP	5 years after permit effective date
1-10	Full implementation of nonstructural controls	6 years after permit effective date
1-11	Performance Evaluation	6, and 7 years after permit effective date
1-12	<p>1. Performance Evaluation.</p> <p>2. Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (<math>P_{exp}</math>) from the PCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load(<math>P_{allow}</math>) plus the applicable Phosphorus Reduction Requirement (<math>P_{RR}</math>) multiplied by 0.80</p> $P_{exp} \leq P_{allow} + (P_{RR} \times 0.80)$	8 years after permit effective date
1-13	Performance Evaluation	9 years after permit effective date
1-14	<p>1. Performance Evaluation.</p> <p>2. Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (<math>P_{exp}</math>) from the PCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load(<math>P_{allow}</math>) plus the applicable Phosphorus Reduction Requirement (<math>P_{RR}</math>) multiplied by 0.75</p>	10 years after permit effective date

	$P_{exp} \leq P_{allow} + (P_{RR} \times 0.75)$	
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**Table F-1: Phase 1 of the PCP components and Milestones**

3) Description of Phase 1 PCP Components

Legal Analysis- 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 regulatory mechanisms that may be necessary to effectively implement the entire PCP. 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.

Funding source assessment – 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.

Scope of the PCP, Baseline Phosphorus Load ( $P_{base}$ ), Phosphorus Reduction Requirement ( $P_{RR}$ ) and Allowable Phosphorus Load ( $P_{allow}$ ) - The permittee shall indicate the area in which it plans to implement the PCP. The permittee must choose one of the following: (1) to implement its PCP in the entire area within its jurisdiction (for municipalities this would be the municipal boundary) within the Charles River Watershed; or (2) to implement its PCP only in the urbanized area portion of the permittee’s jurisdiction within the Charles River Watershed. The implementation area selected by the permittee is known as the “PCP Area” for that permittee. Table F-2<sup>3</sup> and Table F-3<sup>4</sup> list the permittees subject to phosphorus reduction requirements along with the estimated Baseline Phosphorus Loads in mass/yr, the calculated Allowable Stormwater Phosphorus Load in mass/yr, the Stormwater Phosphorus Reduction Requirement in mass/yr and the respective percent reductions necessary. The two tables contain different reduction requirements for each permittee based on the PCP Area they choose (see above). If the permittee chooses to implement the PCP in its entire jurisdiction, the permittee may 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 outside the regulated area. If the permittee chooses to implement the PCP in its regulated area only, the permittee must demonstrate compliance with the Phosphorus Reduction Requirement and Allowable Phosphorus Load requirements applicable to it through structural

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<sup>3</sup> The estimated Baseline Phosphorus Load, Allowable Phosphorus Load, Phosphorus Reduction Requirement and percent reductions presented in Table F-2 apply to the entire watershed land area that drains to the Charles River and its tributaries within the permittee’s jurisdiction.

<sup>4</sup> The estimated Baseline Phosphorus Load, Allowable Phosphorus Load, Phosphorus Reduction Requirement and percent reductions presented in Table F-3 apply only to the urbanized area portion of the permittee’s jurisdiction that drains to the Charles River or its tributaries.

and non-structural controls on discharges that occur within the regulated area only.

The permittee shall select the Baseline Phosphorus Load, Stormwater Phosphorus Reduction Requirement and Allowable Phosphorus Load that corresponds to the PCP Area selected. The selected Stormwater Phosphorus Reduction Requirement and Allowable Phosphorus Load will be used to determine compliance with PCP milestones of this Phase and Phase 2 and Phase 3. If the permittee chooses to implement its PCP in all areas within its jurisdiction within the Charles River Watershed, then the permittee shall use Table F-2 to determine the Baseline Phosphorus Load, Stormwater Phosphorus Reduction Requirement and Allowable Phosphorus Load for its PCP Area. If the permittee chooses to implement its PCP only within the regulated area within the Charles River Watershed, then the permittee shall use Table F-3 to determine the Baseline Phosphorus Load, Stormwater Phosphorus Reduction Requirement and Allowable Phosphorus Load for its PCP Area.

The Permittee may submit more accurate land use data from 2005, which is the year chosen as the baseline land use for the purposes of permit compliance, for EPA to recalculate baseline phosphorus stormwater loads for use in future permit reissuances. Updated land use maps, land areas, characteristics, and MS4 area and catchment delineations shall be submitted to EPA along with the year 4 annual report in electronic GIS data layer form for consideration for future permit requirements<sup>5</sup>. Until such a time as future permit requirements reflect information submitted in the year 4 annual report, the permittee shall use the Baseline Phosphorus Load, Stormwater Phosphorus Reduction Requirement and Allowable Phosphorus Load Table F-2 (if its PCP Area is the permittee's entire jurisdiction) or Table F-3 (if its PCP Area is the regulated area only) to calculate compliance with milestones for Phase 1, 2, and 3 of the PCP.

Description of Phase 1 planned non-structural controls – The permittee shall describe the non-structural stormwater control measures necessary to support achievement of the phosphorus export milestones in Table F-1. The description of non-structural controls shall include the planned measures, the areas where the measures will be implemented, and the annual phosphorus reductions that are expected to result from their implementation in units of mass/yr. Annual phosphorus reduction from non-structural BMPs shall be calculated consistent with Attachment 2 to Appendix F.

Description of Phase 1 planned structural controls – The permittee shall develop a priority ranking of areas and infrastructure within the municipality for potential implementation of structural phosphorus controls during Phase 1. The ranking shall be developed through the use of available

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<sup>5</sup> This submission is optional and needs only be done if the permittee has more accurate land use information from 2005 than information provided by MassGIS (<http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/lus2005.html>, retrieved 10/1/2013) or the permittee has updated MS4 drainage area characteristics and the permittee would like to update the Baseline Phosphorus Load.

screening and monitoring results collected during the permit term either by the permittee or another entity and the mapping required pursuant to part 2.3.4.6 of the Permit. The permittee shall also include in this priority ranking a detailed assessment of site suitability for potential phosphorus control measures based on soil types and other factors. The permittee shall coordinate this activity with the requirements of part 2.3.6.8.b of the Permit. A description and the results of this priority ranking shall be included in Phase 1 of the PCP. The permittee shall describe the structural stormwater control measures necessary to support achievement of the phosphorus export milestones in Table F-1. The description of structural controls shall include the planned and existing measures, the areas where the measures will be implemented or are currently implemented, and the annual phosphorus reductions in units of mass/yr that are expected to result from their implementation. Structural measures to be implemented by a third party may be included in a municipal PCP. Annual phosphorus reductions from structural BMPs shall be calculated consistent with Attachment 3 to Appendix F.

Description of Operation and Maintenance (O&M) Program for all planned and existing structural BMPs – The permittee shall establish an Operation and Maintenance Program for all structural BMPs being claimed for phosphorus reduction credit as part of Phase 1 of the PCP. This includes BMPs implemented to date as well as BMPs to be implemented during Phase 1 of the PCP. The Operation and Maintenance Program shall become part of the PCP and include: (1) inspection and maintenance schedule for each BMP according to BMP design or manufacturer specification and (2) program or department responsible for BMP maintenance.

Phase 1 Implementation Schedule – A schedule for implementation of all planned Phase 1 BMPs, including, as appropriate: obtaining funding, training, purchasing, construction, inspections, monitoring, operation and maintenance activities, and other assessment and evaluation components of implementation. Implementation of planned BMPs must begin upon completion of the Phase 1 Plan, and all non-structural BMPs shall be fully implemented within six years of the permit effective date. Structural BMPs shall be designed and constructed to ensure the permittee will comply with the 8 and 10 year phosphorus load milestones established in Table F-1. The Phase 1 plan shall be fully implemented as soon as possible, but no later than 10 years after the effective date of permit.

Estimated cost for implementing Phase 1 of the PCP – The permittee shall estimate the cost of implementing the Phase 1 non-structural and structural controls and associated Operation and Maintenance Program. This cost estimate can be used to assess the validity of the funding source assessment completed by year 3 after the permit effective date and to update funding sources as necessary to complete Phase 1.

Complete written Phase 1 Plan – The permittee must complete the written Phase 1 Plan of the PCP no later than 5 years after the permit effective date. The complete Phase 1 Plan shall include Phase 1 PCP item numbers 1-1 through 1-7 in Table F-1. The permittee shall make the Phase 1 Plan

available to the public for public comment during Phase 1 Plan development. EPA encourages the permittee to post the Phase I Plan online to facilitate public involvement.

Performance Evaluation –The permittee shall evaluate the effectiveness of the PCP by tracking the phosphorus reductions achieved through implementation of structural and non-structural BMPs<sup>6</sup> and tracking increases resulting from development. Phosphorus reductions shall be calculated consistent with Attachment 2 to Appendix F (non-structural BMP performance) and Attachment 3 to Appendix F (structural BMP performance) for all BMPs implemented to date. Phosphorus export increases since 2005 due to development shall be calculated consistent with Attachment 1 to Appendix F. Phosphorus loading increases and reductions in unit of mass/yr shall be added or subtracted from the applicable Baseline Phosphorus Load given in Table F-2 or Table F-3 depending on the Scope of PCP chosen to estimate the yearly phosphorous export rate from the PCP Area. The permittee shall also include all information required in part I.2 of this Appendix in each performance evaluation. Performance evaluations will be included as part of each permittee’s annual report as required by part 4.4 of the Permit.

<b>Community Annual Stormwater Phosphorus Load Reduction by Permittee, Charles River Watershed</b>				
<b>Community</b>	<b>Baseline Phosphorus Load, kg/yr</b>	<b>Stormwater Phosphorus Load Reduction Requirement kg/yr</b>	<b>Allowable Phosphorus Load, kg/yr</b>	<b>Stormwater Percent Reduction in Phosphorus Load (%)</b>
Arlington	106	57	49	53%
Ashland	67	23	44	34%
Bellingham	947	331	616	35%
Belmont	202	86	116	42%
Brookline	1,635	789	846	48%
Cambridge	512	263	249	51%
Dedham	805	325	480	40%
Dover	831	137	694	17%
Foxborough	2	0	2	0%
Franklin	2,344	818	1,526	35%

<sup>6</sup> In meeting its phosphorus reduction requirements a permittee may quantify phosphorus reductions by actions undertaken by another entity, except where those actions are credited to MassDOT or another permittee identified in Appendix F Table F-2 or F-3.

<b>Community Annual Stormwater Phosphorus Load Reduction by Permittee, Charles River Watershed</b>				
<b>Community</b>	<b>Baseline Phosphorus Load, kg/yr</b>	<b>Stormwater Phosphorus Load Reduction Requirement kg/yr</b>	<b>Allowable Phosphorus Load, kg/yr</b>	<b>Stormwater Percent Reduction in Phosphorus Load (%)</b>
Holliston	1,543	395	1,148	26%
Hopedale	107	37	70	35%
Hopkinton	292	66	226	22%
Lexington	530	194	336	37%
Lincoln	593	101	492	17%
Medfield	955	277	678	29%
Medway	1,063	314	749	30%
Mendon	29	9	20	31%
Milford	1,611	663	948	41%
Millis	969	248	721	26%
Natick	1,108	385	723	35%
Needham	1,772	796	976	45%
Newton	3,884	1,941	1,943	50%
Norfolk	1,004	232	772	23%
Somerville	646	331	315	51%
Sherborn	846	131	715	16%
Walpole	159	28	131	18%
Waltham	2,901	1,461	1,400	50%
Watertown	1,127	582	545	52%
Wayland	46	15	31	33%
Wellesley	1,431	661	770	46%
Weston	1,174	281	893	24%
Westwood	376	114	262	30%
Wrentham	618	171	447	28%
Mass-DCR	421	91	330	22%

**Table F-2: Baseline Phosphorus Load, Phosphorus Reduction Requirement, Allowable Phosphorus Load and Percent Reduction in Phosphorus Load from Charles River Watershed. For use when PCP Area is chosen to be the entire community within the Charles River Watershed.**

<b>Urbanized Area Annual Stormwater Phosphorus Load Reduction by Permittee, Charles River Watershed</b>				
<b>Community</b>	<b>Baseline Watershed Phosphorus Load, kg/yr</b>	<b>Stormwater Phosphorus Load Reduction Requirement, kg/yr</b>	<b>Allowable Phosphorus Load, kg/yr</b>	<b>Stormwater Percent Reduction in Phosphorus Load (%)</b>
Arlington	106	57	49	53%
Ashland	67	23	44	34%
Bellingham	801	291	510	36%
Belmont	202	86	116	42%
Brookline	1,635	789	846	48%
Cambridge	512	263	249	51%
Dedham	805	325	480	40%
Dover	282	54	228	19%
Foxborough	2	0	2	0%
Franklin	2,312	813	1,499	35%
Holliston	1,359	369	990	27%
Hopedale	107	37	70	35%
Hopkinton	280	65	215	23%
Lexington	525	193	332	37%
Lincoln	366	63	303	17%
Medfield	827	267	560	33%
Medway	1,037	305	732	29%
Mendon	10	5	5	50%
Milford	1,486	653	833	44%
Millis	501	159	342	32%
Natick	994	359	635	36%
Needham	1,771	795	976	45%
Newton	3,884	1,941	1,943	50%
Norfolk	1,001	231	770	23%
Somerville	646	331	315	51%
Sherborn	203	38	165	19%
Walpole	159	28	131	18%
Waltham	2,901	1,461	1,440	50%
Watertown	1,127	582	545	52%
Wayland	46	15	31	33%
Wellesley	1,431	661	770	46%

Urbanized Area Annual Stormwater Phosphorus Load Reduction by Permittee, Charles River Watershed				
Community	Baseline Watershed Phosphorus Load, kg/yr	Stormwater Phosphorus Load Reduction Requirement, kg/yr	Allowable Phosphorus Load, kg/yr	Stormwater Percent Reduction in Phosphorus Load (%)
Weston	1,174	281	893	24%
Westwood	346	108	238	31%
Wrentham	556	159	397	29%
Mass DCR	396	89	307	22%

**Table F-3: Baseline Phosphorus Load, Phosphorus Reduction Requirement, Allowable Phosphorus Load and Percent Reduction in Phosphorus Load from Charles River Watershed. For use when PCP Area is chosen to be only the urbanized area portion of a permittee’s jurisdiction within the Charles River Watershed.**

**b. Phase 2**

- 1) The permittee shall complete the Phase 2 Plan of the PCP 10 years after the permit effective date and fully implement the Phase 2 plan of the PCP as soon as possible but no longer than 15 years after the permit effective date.
- 2) The Phase 2 plan of the PCP shall be added to the Phase 1 Plan and contain the following elements and has the following required milestones:

Item Number	Phase 2 of the PCP Component and Milestones	Completion Date
2-1	Update Legal analysis	As necessary
2-2	Description of Phase 2 planned nonstructural controls	10 years after permit effective date
2-3	Description of Phase 2 planned structural controls	10 years after permit effective date
2-4	Updated description of Operation and Maintenance Program	10 years after permit effective date
2-5	Phase 2 implementation schedule	10 years after permit effective date
2-6	Estimated cost for implementing Phase 2 of the PCP	10 years after permit effective date

2-7	Complete written Phase 2 Plan	10 years after permit effective date
2-8	Performance Evaluation.	11, and 12 years after permit effective date
2-9	<ol style="list-style-type: none"> <li>Performance Evaluation.</li> <li>Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (<math>P_{exp}</math>) from the PCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load(<math>P_{allow}</math>) plus the applicable Phosphorus Reduction Requirement (<math>P_{RR}</math>) multiplied by 0.65  <math display="block">P_{exp} \leq P_{allow} + (P_{RR} \times 0.65)</math> </li> </ol>	13 years after permit effective date
2-10	Performance Evaluation	14 years after permit effective date
2-11	<ol style="list-style-type: none"> <li>Performance Evaluation.</li> <li>Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (<math>P_{exp}</math>) from the PCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load(<math>P_{allow}</math>) plus the applicable Phosphorus Reduction Requirement (<math>P_{RR}</math>) multiplied by 0.50  <math display="block">P_{exp} \leq P_{allow} + (P_{RR} \times 0.50)</math> </li> </ol>	15 years after permit effective date

**Table F-4: Phase 2 of the PCP components and Milestones**

3) Description of Phase 2 PCP Components

Updated Legal Analysis- The permittee shall update the legal analysis completed during Phase 1 of the PCP as necessary to include any new or augmented bylaws, ordinances or funding mechanisms the permittee has deemed necessary to implement the PCP. The permittee shall use experience gained during Phase 1 to inform the updated legal analysis. The permittee shall adopt necessary regulatory changes as soon as possible to implement the Phase 2 Plan.

Description of Phase 2 planned non-structural controls – The permittee shall describe the non-structural stormwater control measures necessary to support achievement of the phosphorus export milestones in Table F-4. The description of non-structural controls shall include the planned measures, the areas where the measures will be implemented, and the annual phosphorus reductions that are expected to result from their implementation in units of mass/yr. Annual phosphorus reduction from non-structural BMPs shall be calculated consistent with Attachment 2 to Appendix F.

Description of planned Phase 2 structural controls – The permittee shall develop a priority ranking of areas and infrastructure within the municipality for potential implementation of phosphorus control practices during Phase 2. The ranking shall build upon the ranking developed for Phase 1. The permittee shall describe the structural stormwater control measures necessary to support achievement of the phosphorus export milestones in Table F-4. The description of structural controls shall include the planned measures, the areas where the measures will be implemented, and the annual phosphorus reductions in units of mass/yr that are expected to result from their implementation. Structural measures to be implemented by a third party<sup>7</sup> may be included in a municipal PCP. Annual phosphorus reductions from structural BMPs shall be calculated consistent with Attachment 3 to Appendix F.

Updated description of Operation and Maintenance (O&M) Program for all planned and existing structural BMPs – The permittee shall establish an Operation and Maintenance Program for all structural BMPs being claimed for phosphorus reduction credit as part of Phase 1 and 2 of the PCP. This includes BMPs implemented to date as well as BMPs to be implemented during Phase 2 of the PCP. The Operation and Maintenance Program shall become part of the PCP and include: (1) inspection and maintenance schedule for each BMP according to BMP design or manufacturer specification and (2) program or department responsible for BMP maintenance.

Phase 2 Implementation Schedule – A schedule for implementation of all planned Phase 2 BMPs, including, as appropriate: funding, training, purchasing, construction, inspections, monitoring, O&M activities and other assessment and evaluation components of implementation. Implementation of planned BMPs must begin upon completion of the Phase 2 Plan. Structural BMPs shall be designed and constructed to ensure the permittee will comply with the 13 and 15 year milestones established in Table F-4. The Phase 2 plan shall be fully implemented as soon as possible, but no later than 15 years after the effective date of permit.

Estimated cost for implementing Phase 2 of the PCP – The permittee shall estimate the cost of implementing the Phase 2 non-structural and structural controls and associated Operation and Maintenance Program. This cost estimate can be used to plan for the full implementation of Phase 2.

Complete written Phase 2 Plan – The permittee must complete a written Phase 2 Plan of the PCP no later than 10 years after the permit effective date. The complete Phase 2 Plan shall include Phase 2 PCP item numbers 2-1 through 2-6 in Table F-4. The permittee shall make the Phase 2 Plan available to the public for public comment during Phase 2 plan development. EPA encourages the permittee to post the Phase 2 Plan online to facilitate public involvement.

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<sup>7</sup> See footnote 6

**Performance Evaluation** – The permittee shall evaluate the effectiveness of the PCP by tracking the phosphorus reductions achieved through implementation of structural and non-structural BMPs<sup>8</sup> and tracking increases resulting from development. Phosphorus reductions shall be calculated consistent with Attachment 2 to Appendix F (non-structural BMP performance) and Attachment 3 to Appendix F (structural BMP performance) for all BMPs implemented to date. Phosphorus export increases due to development shall be calculated consistent with Attachment 1 to Appendix F. Phosphorus loading increases and reductions in unit of mass/yr shall be added or subtracted from the applicable Baseline Phosphorus Load given in Table F-2 or Table F-3 depending on the Scope of PCP chosen to estimate the yearly phosphorous export rate from the PCP Area. The permittee shall also include all information required in part I.2 of this Appendix in each performance evaluation. Performance evaluations will be included as part of each permittee’s annual report as required by part 4.4 of the Permit.

**c. Phase 3**

- 1) The permittee shall complete the Phase 3 Plan of the PCP 15 years after the permit effective date and fully implement the Phase 3 plan of the PCP as soon as possible but no longer than 20 years after the permit effective date.
- 2) The Phase 3 plan of the PCP shall be added to the Phase 1 Plan and the Phase 2 Plan to create the comprehensive PCP and contain the following elements and has the following required milestones:

<b>Item Number</b>	<b>Phase 3 of the PCP Component and Milestones</b>	<b>Completion Date</b>
3-1	Update Legal analysis	As necessary
3-2	Description of Phase 3 planned nonstructural controls	15 years after permit effective date
3-3	Description of Phase 3 planned structural controls	15 years after permit effective date
3-4	Updated description of Operation and Maintenance (O&M) Program	15 years after permit effective date
3-5	Phase 3 implementation schedule	15 years after permit effective date
3-6	Estimated cost for implementing Phase 3 of the PCP	15 years after permit effective date
3-7	Complete written Phase 3 Plan	15 years after permit effective date

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<sup>8</sup> See footnote 9

3-8	Performance Evaluation.	16, and 17 years after permit effective date
3-9	<ol style="list-style-type: none"> <li>Performance Evaluation.</li> <li>Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (<math>P_{exp}</math>) from the PCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load (<math>P_{allow}</math>) plus the applicable Phosphorus Reduction Requirement (<math>P_{RR}</math>) multiplied by 0.30  <math display="block">P_{exp} \leq P_{allow} + (P_{RR} \times 0.30)</math> </li> </ol>	18 years after permit effective date
3-10	Performance Evaluation	19 years after permit effective date
3-11	<ol style="list-style-type: none"> <li>Performance Evaluation.</li> <li>Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (<math>P_{exp}</math>) from the PCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load (<math>P_{allow}</math>)  <math display="block">P_{exp} \leq P_{allow}</math> </li> </ol>	20 years after permit effective date

**Table F-5:Phase 3 of the PCP components and Milestones**

3) Description of Phase 3 PCP Components

Updated Legal Analysis- The permittee shall update the legal analysis completed during Phase 1 and Phase 2 of the PCP as necessary to include any new or augmented bylaws, ordinances or funding mechanisms the permittee has deemed necessary to implement the PCP. The permittee shall use experience gained during Phase 1 and Phase 2 to inform the updated legal analysis. The permittee shall adopt necessary regulatory changes as soon as possible to implement the Phase 3 Plan.

Description of Phase 3 planned non-structural controls – The permittee shall describe the non-structural stormwater control measures necessary to support achievement of the phosphorus export milestones in Table F-5. The description of non-structural controls shall include the planned measures, the areas where the measures will be implemented, and the annual phosphorus reductions that are expected to result from their implementation in units of mass/yr. Annual phosphorus reduction from non-structural BMPs shall be calculated consistent with Attachment 2 to Appendix F.

Description of planned Phase 3 structural controls – The permittee shall develop a priority ranking of areas and infrastructure within the municipality for potential implementation of phosphorus control practices during Phase 3. The ranking shall build upon the ranking developed for

Phase 1 and 2. The permittee shall describe the structural stormwater control measures necessary to support achievement of the phosphorus export milestones in Table F-5. The description of structural controls shall include the planned measures, the areas where the measures will be implemented, and the annual phosphorus reductions in units of mass/yr that are expected to result from their implementation. Structural measures to be implemented by a third party may be included in a municipal PCP. Annual phosphorus reduction from structural BMPs shall be calculated consistent with Attachment 3 to Appendix F.

Updated description of Operation and Maintenance (O&M) Program for all planned and existing structural BMPs – The permittee shall establish an Operation and Maintenance Program for all structural BMPs being claimed for phosphorus reduction credit as part of Phase 1, 2 and 3 of the PCP. This includes BMPs implemented to date as well as BMPs to be implemented during Phase 3 of the PCP. The Operation and Maintenance Program shall become part of the PCP and include: (1) inspection and maintenance schedule for each BMP according to BMP design or manufacturer specification and (2) program or department responsible for BMP maintenance.

Phase 3 Implementation Schedule – A schedule for implementation of all planned Phase 3 BMPs, including, as appropriate: funding, training, purchasing, construction, inspections, monitoring, O&M activities and other assessment and evaluation components of implementation. Implementation of planned BMPs must begin upon completion of the Phase 3 Plan. Structural BMPs shall be designed and constructed to ensure the permittee will comply with the 18 and 20 year milestones established in Table F-5. The Phase 3 plan shall be fully implemented as soon as possible, but no later than 20 years after the effective date of permit.

Estimated cost for implementing Phase 3 of the PCP – The permittee shall estimate the cost of implementing the Phase 3 non-structural and structural controls and associated Operation and Maintenance Program. This cost estimate can be used to plan for the full implementation of Phase 3.

Complete written Phase 3 Plan – The permittee must complete the written Phase 3 Plan of the PCP no later than 15 years after the permit effective date. The complete Phase 3 Plan shall include Phase 3 PCP item numbers 3-1 through 3-6 in Table F-5. The permittee shall make the Phase 3 Plan available to the public for public comment during Phase 3 Plan development. EPA encourages the permittee to post the Phase 3 Plan online to facilitate public involvement.

Performance Evaluation – The permittee shall evaluate the effectiveness of the PCP by tracking the phosphorus reductions achieved through implementation of structural and non-structural BMPs<sup>9</sup> and tracking increases resulting from development. Phosphorus reductions shall be calculated consistent with Attachment 2 to Appendix F (non-structural BMP

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<sup>9</sup> See footnote 9

performance) and Attachment 3 to Appendix F (structural BMP performance) for all BMPs implemented to date. Phosphorus export increases due to development shall be calculated consistent with Attachment 1 to Appendix F. Phosphorus loading increases and reductions in unit of mass/yr shall be added or subtracted from the applicable Baseline Phosphorus Load given in Table F-2 or Table F-3 depending on the Scope of PCP chosen to estimate the yearly phosphorous export rate from the PCP Area. The permittee shall also include all information required in part I.2 of this Appendix in each performance evaluation. Performance evaluations will be included as part of each permittee’s annual report as required by part 4.4 of the Permit.

2. Reporting

Beginning 1 year after the permit effective date, the permittee shall include a progress report in each annual report on the planning and implementation of the PCP.

Beginning five (5) years after the permit effective date, the permittee shall include the following in each annual report submitted pursuant to part 4.4 of the Permit:

- a. All non-structural control measures implemented during the reporting year along with the phosphorus reduction in mass/yr ( $P_{NSred}$ ) calculated consistent with Attachment 2 to Appendix F
- b. Structural controls implemented during the reporting year and all previous years including:
  - a. Location information of structural BMPs (GPS coordinates or street address)
  - b. Phosphorus reduction from all structural BMPs implemented to date in mass/yr ( $P_{Sred}$ ) calculated consistent with Attachment 3 to Appendix F
  - c. Date of last completed maintenance and inspection for each Structural control
- c. Phosphorus load increases due to development over the previous reporting period and incurred since 2005 ( $P_{DEVinc}$ ) calculated consistent with Attachment 1 to Appendix F.
- d. Estimated yearly phosphorus export rate ( $P_{exp}$ ) from the PCP Area calculated using Equation 2. Equation 2 calculates the yearly phosphorus export rate by subtracting yearly phosphorus reductions through implemented nonstructural controls and structural controls to date from the Baseline Phosphorus Load and adding loading increases incurred through development to date. This equation shall be used to demonstrate compliance with the phosphorus reduction milestones required as part of each phase of the PCP.

$$P_{exp} \left( \frac{mass}{yr} \right) = P_{base} \left( \frac{mass}{yr} \right) - \left( P_{Sred} \left( \frac{mass}{yr} \right) + P_{NSred} \left( \frac{mass}{yr} \right) \right) + P_{DEVinc} \left( \frac{mass}{yr} \right)$$

**Equation 1. Equation used to calculate yearly phosphorus export rate from the chosen PCP Area.  $P_{exp}$ =Current phosphorus export rate from the PCP Area in mass/year.  $P_{base}$ =baseline phosphorus export rate from LPCP Area in mass/year.  $P_{Sred}$ = yearly phosphorus reduction from implemented structural controls in the PCP Area in mass/year.  $P_{NSred}$ = yearly phosphorus reduction from implemented non-structural controls in the PCP Area in mass/year.  $P_{DEVinc}$ = yearly phosphorus increase resulting from development since 2005 in the PCP Area in mass/year.**

- e. Certification that all structural BMPs are being inspected and maintained according to the O&M program specified as part of the PCP. The certification statement shall be:

*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.*

- f. Certification that all municipally owned and maintained turf grass areas are being managed in accordance with Massachusetts Regulation 331 CMR 31 pertaining to proper use of fertilizers on turf grasses (see <http://www.mass.gov/courts/docs/lawlib/300-399cmr/330cmr31.pdf>).

3. At any time during the permit term the permittee may be relieved of additional requirements in Appendix F part A.I.1. as follows.

- a. The permittee is relieved of its additional requirements as of the date when the following conditions are met:
  - i. The applicable TMDL has been modified, revised or withdrawn and EPA has approved a new TMDL applicable for the receiving water that indicates that no additional stormwater controls for the control of phosphorus are necessary for the permittee's discharge based on wasteload allocations in the newly approved TMDL
- b. When the criteria in Appendix F part A.I.3.a. are met, the permittee shall document the date of the approved TMDL in its SWMP and is relieved of any remaining requirements of Appendix F part A.I.1 as of that date and the permittee shall comply with the following:
  - i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix F part A.I.1 to date to reduce phosphorus in their discharges including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
  - ii. The permittee shall continue to implement all requirements of Appendix F part A.I.1 required to be implemented prior to the date of the newly approved TMDL, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications, and the reporting requirements of Appendix F part I.2. remain in place.

**II. Lake and Pond Phosphorus TMDL Requirements**

Between 1999 and 2010 EPA has approved 13 Lake TMDLs<sup>10</sup> completed by MassDEP covering 78 lakes and ponds within the Commonwealth of Massachusetts. Any permittee (traditional or non-traditional) that discharges to a waterbody segment in Table F-6 is subject to the requirements of this part.

1. Permittees that operate regulated MS4s (traditional and non-traditional) that discharge to the identified impaired waters or their tributaries must reduce phosphorus discharges to support achievement of phosphorus load reductions identified in the TMDLs. To address phosphorus, all permittees with a phosphorus reduction requirement greater than 0% shall develop a Lake Phosphorus Control Plan (LPCP) designed to reduce the amount of phosphorus in stormwater discharges from its MS4 to the impaired waterbody or its tributaries in accordance with the phosphorus load reduction requirements set forth in Table F-6 below. Permittees discharging to waterbodies in Table F-6 with an associated 0% Phosphorus Required Percent Reduction are subject to Appendix F part II.2.f and are relieved of the requirements of Appendix F part II.1.i through Appendix F part II.2.e Table F-6 identifies the primary municipalities<sup>11</sup> located within the watershed of the respective lake or pond and the percent phosphorus reductions necessary from urban stormwater sources. Any permittee (traditional or non-traditional) that discharges to a lake or pond listed in Table F-6 or its tributaries is subject to the same phosphorus percent reduction requirements associated with that lake or pond.

<b>Primary Municipality</b>	<b>Waterbody Name</b>	<b>Required Percent Reduction</b>
Auburn	Leesville Pond	31%
	Auburn Pond	24%
	Eddy Pond	0%
	Pondville Pond	8%
	Stoneville Pond	3%
Charlton	Buffumville Lake	28%
	Dresser Hill Pond	17%
	Gore Pond	14%
	Granite Reservoir	11%
	Jones Pond	13%
	Pierpoint Meadow Pond	27%
Dudley	Pikes Pond	38%
	Gore Pond	14%

<sup>10</sup> Final TMDLs for lakes and ponds in the Northern Blackstone River Watershed, Chicopee Basin, Connecticut Basin, French Basin, Millers Basin and Bare Hill Pond, Flint Pond, Indian Lake, Lake Boon, Leesville Pond, Salisbury Pond, White Island Pond, Quaboag Pond and Quacumquasit Pond can be found here: <http://www.mass.gov/eea/agencies/massdep/water/watersheds/total-maximum-daily-loads-tmdl.html>

<sup>11</sup> Primary municipalities indicate the municipality in which the majority of the lake or pond is located but does not necessarily indicate each municipality that has urbanized area that discharges to the lake or pond or its tributaries.

<b>Primary Municipality</b>	<b>Waterbody Name</b>	<b>Required Percent Reduction</b>
	Larner Pond	55%
	New Pond	56%
	Pierpoint Meadow Pond	27%
	Shepherd Pond	25%
	Tobins Pond	62%
	Wallis Pond	54%
	Gardner	Hilchey Pond
Parker Pond		47%
Bents Pond		52%
Ramsdall Pond		49%
Grafton	Flint Pond/Lake Quinsigamond	59%
Granby	Aldrich Lake East	0%
Hadley	Lake Warner	24%
Harvard	Bare Hill Pond	2%
Hudson	Lake Boon	28%
Leicester	Smiths Pond	30%
	Southwick Pond	64%
	Cedar Meadow Pond	17%
	Dutton Pond	23%
	Greenville Pond	14%
	Rochdale Pond	8%
Ludlow	Minechoag Pond	48%
Millbury	Brierly Pond	14%
	Dorothy Pond	1%
	Howe Reservoir	48%
Oxford	Buffumville Lake	28%
	Hudson Pond	37%
	Lowes Pond	51%
	McKinstry Pond	79%
	Robinson Pond	8%
	Texas Pond	21%
Shrewsbury	Flint Pond/Lake Quinsigamond	49%
	Jordan Pond	60%
	Mill Pond	43%
	Newton Pond	19%
	Shirley Street Pond	30%
Spencer	Quaboag Pond	29%

Primary Municipality	Waterbody Name	Required Percent Reduction
	Quacumquasit Pond	2%
	Jones Pond	13%
	Sugden Reservoir	31%
Springfield	Loon Pond	10%
	Long Pond	56%
	Mona Lake	57%
Stow	Lake Boon	28%
Templeton	Brazell Pond	62%
	Depot Pond	50%
	Bourn-Hadley Pond	49%
	Greenwood Pond 2	56%
Wilbraham	Spectacle Pond	45%
Winchendon	Lake Denison	22%
	Stoddard Pond	24%
	Whitney Pond	16%
	Whites Mill Pond	21%

**Table F-6: Phosphorus impaired Lakes or Ponds subject to a TMDL along with primary municipality and required percent reduction of phosphorus from urban stormwater sources**

- i. The LPCP shall be implemented in accordance with the following schedule and contain the following elements:
  - a. LPCP Implementation Schedule – The permittee shall complete its LPCP and fully implement all of the control measures in its LPCP as soon as possible but no later than 15 years after the effective date of the permit.
  - b. The LPCP shall be implemented in accordance with the following schedule and contain the following elements:

Number	LPCP Component and Milestones	Completion Date
1	Legal Analysis	2 years after permit effective date
2	Funding source assessment	3 years after permit effective date
3	Define LPCP scope (LPCP Area)	4 years after permit effective date
4	Calculate Baseline Phosphorus, Allowable Phosphorus Load and Phosphorus Reduction Requirement	4 years after permit effective date

5	Description of planned nonstructural and structural controls	5 years after permit effective date
6	Description of Operation and Maintenance (O&M) Program	5 years after permit effective date
7	Implementation schedule	5 years after permit effective date
8	Cost and Funding Source Assessment	5 years after permit effective date
9	Complete written LPCP	5 years after permit effective date
10	Full implementation of nonstructural controls.	6 years after permit effective date
11	Performance Evaluation.	6 and 7 years after permit effective date
12	<ol style="list-style-type: none"> <li>1. Performance Evaluation.</li> <li>2. Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (<math>P_{exp}</math>) from the LPCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load(<math>P_{allow}</math>) plus the applicable Phosphorus Reduction Requirement (<math>P_{RR}</math>) multiplied by 0.80  <math display="block">P_{exp} \leq P_{allow} + (P_{RR} \times 0.80)</math> </li> </ol>	8 years after permit effective date
13	Performance Evaluation	9 years after permit effective date
14	<ol style="list-style-type: none"> <li>1. Performance Evaluation.</li> <li>2. Update LPCP</li> <li>3. Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (<math>P_{exp}</math>) from the LPCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load(<math>P_{allow}</math>) plus the applicable Phosphorus Reduction Requirement (<math>P_{RR}</math>) multiplied by 0.60  <math display="block">P_{exp} \leq P_{allow} + (P_{RR} \times 0.60)</math>                     OR that the permittee has reduced their phosphorus export rate by 30kg/year (whichever is greater, unless full Phosphorus Reduction Requirement has been met)                 </li> </ol>	10years after permit effective date
15	Performance Evaluation	11 and 12 years after permit effective date
16	<ol style="list-style-type: none"> <li>1. Performance Evaluation.</li> <li>2. Full implementation of all structural controls used to demonstrate that the total phosphorus export rate (<math>P_{exp}</math>) from the LPCP Area in mass/yr is equal to or less than the applicable Allowable</li> </ol>	13years after permit effective date

	Phosphorus Load( $P_{allow}$ ) plus the applicable Phosphorus Reduction Requirement ( $P_{RR}$ ) multiplied by 0.30 $P_{exp} \leq P_{allow} + (P_{RR} \times 0.30)$	
17	Performance Evaluation	14 years after permit effective date
18	1. Performance Evaluation. 2. Full implementation of all structural controls used to demonstrate that the total phosphorus export rate ( $P_{exp}$ ) from the LPCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load( $P_{allow}$ ) $P_{exp} \leq P_{allow}$	15 years after permit effective date

**Table F-7: LPCP components and milestones**

c. Description of LPCP Components:

Legal Analysis- 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.

Scope of the LPCP (LPCP Area) - 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 non-structural 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.

Calculate Baseline Phosphorus Load ( $P_{base}$ ), Phosphorus Reduction Requirement ( $P_{RR}$ ) and Allowable Phosphorus Load ( $P_{allow}$ ) –Permittees shall calculate their numerical Allowable Phosphorus Load and Phosphorus Reduction Requirement in mass/yr by first estimating their Baseline Phosphorus Load in 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.

Description of planned non-structural controls – The permittee shall describe the non-structural stormwater control measures to be implemented to support the achievement of the milestones in Table F-7. The description of non-structural controls shall include the planned measures, the areas where the measures will be implemented, and the annual phosphorus reductions that are expected to result from their implementation. Annual phosphorus reduction from non-structural BMPs shall be calculated consistent with Attachment 2 to Appendix F. The permittee shall update the description of planned non-structural controls as needed to support the achievement of the milestones in Table F-7, including an update in the updated written LPCP 10 years after the permit effective date.

Description of planned structural controls – The permittee shall develop a priority ranking of areas and infrastructure within the municipality for potential implementation of phosphorus control practices. The ranking shall be developed through the use of available screening and monitoring results collected during the permit term either by the permittee or another entity and the mapping required pursuant to part 2.3.4.6 of the Permit. The permittee shall also include in this prioritization a detailed assessment of site suitability for potential phosphorus control measures based on soil types and other factors. The permittee shall coordinate this activity with the requirements of part 2.3.6.8.b of the Permit. A description and the result of this priority ranking shall be included in the LPCP. The permittee shall describe the structural stormwater control measures necessary to support achievement of the milestones in Table F-7. The description of structural controls shall include the planned measures, the areas where the measures will be implemented, and the annual phosphorus reductions in units of mass/yr that are expected to result from their implementation. Structural measures to be implemented by a third party may be included in the LPCP. Annual phosphorus reduction from structural BMPs shall be calculated consistent with Attachment 3 to Appendix F. The permittee shall update the description of planned structural controls as needed to support the achievement of the milestones in Table F-7, including an update in the updated written LPCP 10 years after the permit effective date.

Description of Operation and Maintenance (O&M) Program for all planned and existing structural BMPs – The permittee shall establish an Operation and Maintenance Program for all structural BMPs being claimed for phosphorus reduction credit as part of Phase 1 and 2 of the PCP. This includes BMPs implemented to date as well as BMPs to be implemented during Phase 2 of the PCP. The Operation and Maintenance Program shall become part of the PCP and include: (1) inspection and maintenance schedule for each BMP according to BMP design or manufacturer specification and (2) program or department responsible for BMP maintenance.

Implementation Schedule – An initial schedule for implementing the BMPs, including, as appropriate: funding, training, purchasing, construction, inspections, monitoring, O&M and other assessment and evaluation components of implementation. Implementation of planned BMPs must begin upon completion of the LPCP, and all non-structural BMPs shall be fully implemented within six years of the permit effective date. Where planned structural BMP retrofits or major drainage infrastructure projects are expected to take additional time to construct, the permittee shall within four years of the effective date of the permit have a schedule for completion of construction consistent with the reduction requirements in Table F-7. The permittee shall complete the implementation of its LPCP as soon as possible or at a minimum in accordance with the milestones set forth in Table F-7. The implementation schedule shall be updated as needed to support the achievement of the milestones in Table F-7, including an update in the updated written LPCP 10 years after the permit effective date.

Cost and funding source assessment – The permittee shall estimate the cost for implementing its LPCP and describe known and anticipated funding mechanisms. 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.

Complete written LPCP – The permittee must complete the written LPCP 5 years after permit effective date. The complete LPCP shall include item numbers 1-8 in Table F-7. The permittee shall make the LPCP available to the public for public comment during the LPCP development. EPA encourages the permittee to post the LPCP online to facilitate public involvement. The LPCP shall be updated as needed with an update 10 years after the permit effective date at a minimum to reflect changes in BMP implementation to support achievement of the phosphorus export milestones in Table F-7. The updated LPCP shall build upon the original LPCP and include additional or new BMPs the permittee will use to support the achievement of the milestones in Table F-7.

Performance Evaluation – The permittee shall evaluate the effectiveness of the LPCP by tracking the phosphorus reductions achieved through implementation of structural and non-structural BMPs<sup>12</sup> and tracking increases in phosphorus loading from the LPCP Area beginning six years after the effective date of the permit. Phosphorus reductions shall be calculated consistent with Attachment 2 (non-structural BMP performance), Attachment 3 (structural BMP performance) and Attachment 1 (reductions through land use change), to Appendix F for all BMPs implemented to date<sup>13</sup>. Phosphorus load increases resulting from development shall be calculated consistent with Attachment 1 to Appendix F. Phosphorus

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<sup>12</sup> In meeting its phosphorus reduction requirements a permittee may quantify phosphorus reductions by actions undertaken by another entity, except where those actions are credited to MassDOT or another permittee identified in Appendix F Table F-7

<sup>13</sup> Annual phosphorus reductions from structural BMPs installed in the LPCP Area prior to the effective date of this permit shall be calculated consistent with Attachment 3 to Appendix F. Phosphorus Reduction Credit for previously installed BMPs will only be given if the Permittee demonstrates that the BMP is performing up to design specifications and certifies that the BMP is properly maintained and inspected according to manufacturer design or specifications. This certification shall be part of the annual performance evaluation during the year credit is claimed for the previously installed BMP.

loading increases and reductions in units of mass/yr shall be added or subtracted from the calculated Baseline Phosphorus Load to estimate the yearly phosphorous export rate from the LPCP Area in mass/yr. The permittee shall also include all information required in part II.2 of this Appendix in each performance evaluation.

2. Reporting

Beginning 1 year after the permit effective date, the permittee shall include a progress report in each annual report on the planning and implementation of the LPCP.

Beginning five (5) years after the permit effective date, the permittee shall include the following in each annual report submitted pursuant to part 4.4 of the Permit:

- a. All non-structural control measures implemented during the reporting year along with the phosphorus reduction in mass/yr ( $P_{NSred}$ ) calculated consistent with Attachment 2 to Appendix F
- b. Structural controls implemented during the reporting year and all previous years including:
  - a. Location information of structural BMPs (GPS coordinates or street address)
  - b. Phosphorus reduction from all structural BMPs implemented to date in mass/yr ( $P_{Sred}$ ) calculated consistent with Attachment 3 to Appendix F
  - c. Date of last completed maintenance for each Structural control
- c. Phosphorus load increases due to development over the previous reporting period and incurred to date ( $P_{DEVinc}$ ) calculated consistent with Attachment 1 to Appendix F.
- d. Estimated yearly phosphorus export rate ( $P_{exp}$ ) from the LPCP Area calculated using Equation 2. Equation 2 calculates the yearly phosphorus export rate by subtracting yearly phosphorus reductions through implemented nonstructural controls and structural controls to date from the Baseline Phosphorus Load and adding loading increases incurred through development to date. This equation shall be used to demonstrate compliance with the phosphorus reduction milestones required as part of each phase of the LPCP.

$$P_{exp} \left( \frac{\text{mass}}{\text{yr}} \right) = P_{base} \left( \frac{\text{mass}}{\text{yr}} \right) - \left( P_{Sred} \left( \frac{\text{mass}}{\text{yr}} \right) + P_{NSred} \left( \frac{\text{mass}}{\text{yr}} \right) \right) + P_{DEVinc} \left( \frac{\text{mass}}{\text{yr}} \right)$$

**Equation 2. Equation used to calculate yearly phosphorus export rate from the chosen LPCP Area.  $P_{exp}$ =Current phosphorus export rate from the LPCP Area in mass/year.  $P_{base}$ =baseline phosphorus export rate from LPCP Area in mass/year.  $P_{Sred}$ = yearly phosphorus reduction from implemented structural controls in the LPCP Area in mass/year.  $P_{NSred}$ = yearly phosphorus reduction from implemented non-structural controls in the LPCP Area in mass/year. Area in mass/year.  $P_{DEVinc}$ = yearly phosphorus increase resulting from development since the year baseline loading was calculated in the LPCP Area in mass/year.**

- e. Certification that all structural BMPs are being inspected and maintained according to the O&M program specified as part of the PCP. The certification statement shall be:

*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.*

- f. Certification that all municipally owned and maintained turf grass areas are being managed in accordance with Massachusetts Regulation 331 CMR 31 pertaining to proper use of fertilizers on turf grasses (see <http://www.mass.gov/courts/docs/lawlib/300-399cmr/330cmr31.pdf>).
3. At any time during the permit term the permittee may be relieved of additional requirements in Appendix F part A.II.1. as follows:
    - a. The permittee is relieved of its additional requirements as of the date when the following conditions are met:
      - i. The applicable TMDL has been modified, revised or withdrawn and EPA has approved a new TMDL applicable for the receiving water that indicates that no additional stormwater controls for the control of phosphorus are necessary for the permittee's discharge based on wasteload allocations in the newly approved TMDL
    - b. In such a case, the permittee shall document the date of the approved TMDL in its SWMP and is relieved of any additional remaining requirements of Appendix F part A.II.1 as of that date and the permittee shall comply with the following:
      - i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix F part A.II.1 to date to reduce phosphorus in their discharges including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
      - ii. The permittee shall continue to implement all requirements of Appendix F part A.I.1 required to be implemented prior to the date of the newly approved TMDL, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications, and the reporting requirements of Appendix F part A.II.2. remain in place.

**III. Bacteria and Pathogen TMDL Requirements**

There are currently approved 16 approved bacteria (fecal coliform bacteria) or mixed pathogen (fecal coliform, E. coli, and/or enterococcus bacteria) TMDLs for certain waterbodies in Massachusetts.<sup>14</sup> Any permittee (traditional or non-traditional) that discharges to a waterbody segment in Table F-8 is subject to the requirements of this part.

1. Traditional and non-traditional MS4s operating in the municipalities listed in Table F-8 and/or that discharge to a waterbody listed on Table F-8 shall comply with the following BMPs in addition to the requirements of part 2.3 of the Permit, as described below:

- a. Enhanced BMPs

- i. Enhancement of BMPs required by part 2.3 of the permit that shall be implemented during this permit term:

1. part 2.3.3. Public Education: The permittee shall supplement its Residential program with an annual message encouraging the proper management of pet waste, including noting any existing ordinances where appropriate. The permittee or its agents shall disseminate educational materials to dog owners at the time of issuance or renewal of a dog license, or other appropriate time. Education materials shall describe the detrimental impacts of improper management of pet waste, requirements for waste collection and disposal, and penalties for non-compliance. The permittee shall also provide information to owners of septic systems about proper maintenance in any catchment that discharges to a water body impaired for bacteria or pathogens. All public education messages can be combined with requirements of Appendix H part I, II and III as well as Appendix F part A.IV, A.V, B.I, B.II and B.III where appropriate.
2. part 2.3.4 Illicit Discharge: Catchments draining to any waterbody impaired for bacteria or pathogens shall be designated either Problem Catchments or HIGH priority in implementation of the IDDE program.

<b>Primary Municipality</b>	<b>Segment ID</b>	<b>Waterbody Name</b>	<b>Indicator Organism</b>
Abington	MA62-09	Beaver Brook	Escherichia Coli (E. Coli)
Abington	MA62-33	Shumatuscant River	Escherichia Coli (E. Coli)
Acushnet	MA95-31	Acushnet River	Escherichia Coli (E. Coli)
Acushnet	MA95-32	Acushnet River	Escherichia Coli (E. Coli)
Acushnet	MA95-33	Acushnet River	Fecal Coliform

<sup>14</sup> Final bacteria or pathogen TMDLs can be found here: <http://www.mass.gov/eea/agencies/massdep/water/watersheds/total-maximum-daily-loads-tmdls.html>

Andover	MA83-04	Rogers Brook	Fecal Coliform
Andover	MA83-15	Unnamed Tributary	Fecal Coliform
Andover	MA83-18	Shawsheen River	Fecal Coliform
Andover	MA83-19	Shawsheen River	Fecal Coliform
Avon	MA62-07	Trout Brook	Escherichia Coli (E. Coli)
Barnstable	MA96-01	Barnstable Harbor	Fecal Coliform
Barnstable	MA96-02	Bumps River	Fecal Coliform
Barnstable	MA96-04	Centerville River	Fecal Coliform
Barnstable	MA96-05	Hyannis Harbor	Fecal Coliform
Barnstable	MA96-06	Maraspin Creek	Fecal Coliform
Barnstable	MA96-07	Prince Cove	Fecal Coliform
Barnstable	MA96-08	Shoestring Bay	Fecal Coliform
Barnstable	MA96-36	Lewis Bay	Fecal Coliform
Barnstable	MA96-37	Mill Creek	Fecal Coliform
Barnstable	MA96-63	Cotuit Bay	Fecal Coliform
Barnstable	MA96-64	Seapuit River	Fecal Coliform
Barnstable	MA96-66	North Bay	Fecal Coliform
Barnstable	MA96-81	Snows Creek	Fecal Coliform
Barnstable	MA96-82	Hyannis Inner Harbor	Fecal Coliform
Barnstable	MA96-92	Santuit River	Fecal Coliform
Barnstable	MA96-93	Halls Creek	Fecal Coliform
Barnstable	MA96-94	Stewarts Creek	Fecal Coliform
Bedford	MA83-01	Shawsheen River	Fecal Coliform
Bedford	MA83-05	Elm Brook	Fecal Coliform
Bedford	MA83-06	Vine Brook	Fecal Coliform
Bedford	MA83-08	Shawsheen River	Fecal Coliform
Bedford	MA83-10	Kiln Brook	Fecal Coliform
Bedford	MA83-14	Spring Brook	Fecal Coliform
Bedford	MA83-17	Shawsheen River	Fecal Coliform
Bellingham	MA72-03	Charles River	Pathogens
Bellingham	MA72-04	Charles River	Pathogens
Belmont	MA72-28	Beaver Brook	Pathogens
Berkley	MA62-02	Taunton River	Fecal Coliform
Berkley	MA62-03	Taunton River	Fecal Coliform
Berkley	MA62-20	Assonet River	Fecal Coliform
Beverly	MA93-08	Bass River	Fecal Coliform
Beverly	MA93-09	Danvers River	Fecal Coliform
Beverly	MA93-20	Beverly Harbor	Fecal Coliform
Beverly	MA93-25	Salem Sound	Fecal Coliform
Billerica	MA83-14	Spring Brook	Fecal Coliform
Billerica	MA83-17	Shawsheen River	Fecal Coliform

Billerica	MA83-18	Shawsheen River	Fecal Coliform
Bourne	MA95-01	Buttermilk Bay	Fecal Coliform
Bourne	MA95-14	Cape Cod Canal	Fecal Coliform
Bourne	MA95-15	Phinneys Harbor	Fecal Coliform
Bourne	MA95-16	Pocasset River	Fecal Coliform
Bourne	MA95-17	Pocasset Harbor	Fecal Coliform
Bourne	MA95-18	Red Brook Harbor	Fecal Coliform
Bourne	MA95-47	Back River	Fecal Coliform
Bourne	MA95-48	Eel Pond	Fecal Coliform
Brewster	MA96-09	Quivett Creek	Fecal Coliform
Brewster	MA96-27	Namskaket Creek	Fecal Coliform
Bridgewater	MA62-32	Matfield River	Escherichia Coli (E. Coli)
Brockton	MA62-05	Salisbury Plain River	Escherichia Coli (E. Coli)
Brockton	MA62-06	Salisbury Plain River	Escherichia Coli (E. Coli)
Brockton	MA62-07	Trout Brook	Escherichia Coli (E. Coli)
Brockton	MA62-08	Salisbury Brook	Escherichia Coli (E. Coli)
Brockton	MA62-09	Beaver Brook	Escherichia Coli (E. Coli)
Brookline	MA72-11	Muddy River	Pathogens
Burlington	MA83-06	Vine Brook	Fecal Coliform
Burlington	MA83-11	Long Meadow Brook	Fecal Coliform
Burlington	MA83-13	Sandy Brook	Fecal Coliform
Cambridge	MA72-36	Charles River	Pathogens
Cambridge	MA72-38	Charles River	Pathogens
Canton	MA73-01	Neponset River	Fecal Coliform
Canton	MA73-01	Neponset River	Escherichia Coli (E. Coli)
Canton	MA73-02	Neponset River	Fecal Coliform
Canton	MA73-05	East Branch	Fecal Coliform
Canton	MA73-20	Beaver Meadow Brook	Fecal Coliform
Canton	MA73-22	Pequid Brook	Fecal Coliform
Canton	MA73-25	Pecunit Brook	Escherichia Coli (E. Coli)
Canton	MA73-27	Ponkapog Brook	Fecal Coliform
Chatham	MA96-11	Stage Harbor	Fecal Coliform
Chatham	MA96-41	Mill Creek	Fecal Coliform
Chatham	MA96-42	Taylor's Pond	Fecal Coliform
Chatham	MA96-43	Harding Beach Pond	Fecal Coliform
Chatham	MA96-44	Bucks Creek	Fecal Coliform
Chatham	MA96-45	Oyster Pond	Fecal Coliform
Chatham	MA96-46	Oyster Pond River	Fecal Coliform
Chatham	MA96-49	Frost Fish Creek	Pathogens
Chatham	MA96-50	Ryder Cove	Fecal Coliform
Chatham	MA96-51	Muddy Creek	Pathogens

Chatham	MA96-79	Cockle Cove Creek	Fecal Coliform
Chatham	MA96-79	Cockle Cove Creek	Enterococcus Bacteria
Cohasset	MA94-01	Cohasset Harbor	Fecal Coliform
Cohasset	MA94-19	The Gulf	Fecal Coliform
Cohasset	MA94-20	Little Harbor	Fecal Coliform
Cohasset	MA94-32	Cohasset Cove	Fecal Coliform
Concord	MA83-05	Elm Brook	Fecal Coliform
Danvers	MA93-01	Waters River	Fecal Coliform
Danvers	MA93-02	Crane Brook	Escherichia Coli (E. Coli)
Danvers	MA93-04	Porter River	Fecal Coliform
Danvers	MA93-09	Danvers River	Fecal Coliform
Danvers	MA93-36	Frost Fish Brook	Escherichia Coli (E. Coli)
Danvers	MA93-41	Crane River	Fecal Coliform
Dartmouth	MA95-13	Buttonwood Brook	Escherichia Coli (E. Coli)
Dartmouth	MA95-34	Slocums River	Fecal Coliform
Dartmouth	MA95-38	Clarks Cove	Fecal Coliform
Dartmouth	MA95-39	Apponagansett Bay	Fecal Coliform
Dartmouth	MA95-40	East Branch Westport River	Escherichia Coli (E. Coli)
Dartmouth	MA95-62	Buzzards Bay	Fecal Coliform
Dedham	MA72-07	Charles River	Pathogens
Dedham	MA72-21	Rock Meadow Brook	Pathogens
Dedham	MA73-02	Neponset River	Fecal Coliform
Dennis	MA96-09	Quivett Creek	Fecal Coliform
Dennis	MA96-12	Bass River	Fecal Coliform
Dennis	MA96-13	Sesuit Creek	Fecal Coliform
Dennis	MA96-14	Swan Pond River	Fecal Coliform
Dennis	MA96-35	Chase Garden Creek	Fecal Coliform
Dighton	MA62-02	Taunton River	Fecal Coliform
Dighton	MA62-03	Taunton River	Fecal Coliform
Dighton	MA62-50	Broad Cove	Fecal Coliform
Dighton	MA62-51	Muddy Cove Brook	Fecal Coliform
Dighton	MA62-55	Segreganset River	Fecal Coliform
Dighton	MA62-56	Three Mile River	Escherichia Coli (E. Coli)
Dighton	MA62-57	Three Mile River	Fecal Coliform
Dover	MA72-05	Charles River	Pathogens
Dover	MA72-06	Charles River	Pathogens
Duxbury	MA94-15	Duxbury Bay	Fecal Coliform
Duxbury	MA94-30	Bluefish River	Fecal Coliform
East Bridgewater	MA62-06	Salisbury Plain River	Escherichia Coli (E. Coli)
East Bridgewater	MA62-09	Beaver Brook	Escherichia Coli (E. Coli)
East Bridgewater	MA62-32	Matfield River	Escherichia Coli (E. Coli)

East Bridgewater	MA62-33	Shumatuscasant River	Escherichia Coli (E. Coli)
East Bridgewater	MA62-38	Meadow Brook	Escherichia Coli (E. Coli)
Eastham	MA96-15	Boat Meadow River	Fecal Coliform
Eastham	MA96-16	Rock Harbor Creek	Fecal Coliform
Eastham	MA96-34	Wellfleet Harbor	Fecal Coliform
Eastham	MA96-68	Town Cove	Fecal Coliform
Essex	MA93-11	Essex River	Fecal Coliform
Essex	MA93-16	Essex Bay	Fecal Coliform
Essex	MA93-45	Alewife Brook	Escherichia Coli (E. Coli)
Essex	MA93-46	Alewife Brook	Fecal Coliform
Everett	MA93-51	Unnamed Tributary	Enterococcus Bacteria
Fairhaven	MA95-33	Acushnet River	Fecal Coliform
Fairhaven	MA95-42	New Bedford Inner Harbor	Fecal Coliform
Fairhaven	MA95-62	Buzzards Bay	Fecal Coliform
Fairhaven	MA95-63	Outer New Bedford Harbor	Fecal Coliform
Fairhaven	MA95-64	Little Bay	Fecal Coliform
Fairhaven	MA95-65	Nasketucket Bay	Fecal Coliform
Fall River	MA61-06	Mount Hope Bay	Fecal Coliform
Fall River	MA62-04	Taunton River	Fecal Coliform
Falmouth	MA95-20	Wild Harbor	Fecal Coliform
Falmouth	MA95-21	Herring Brook	Fecal Coliform
Falmouth	MA95-22	West Falmouth Harbor	Fecal Coliform
Falmouth	MA95-23	Great Sippewisset Creek	Fecal Coliform
Falmouth	MA95-24	Little Sippewisset Marsh	Fecal Coliform
Falmouth	MA95-25	Quissett Harbor	Fecal Coliform
Falmouth	MA95-46	Harbor Head	Fecal Coliform
Falmouth	MA96-17	Falmouth Inner Harbor	Fecal Coliform
Falmouth	MA96-18	Great Harbor	Fecal Coliform
Falmouth	MA96-19	Little Harbor	Fecal Coliform
Falmouth	MA96-20	Quashnet River	Fecal Coliform
Falmouth	MA96-21	Waquoit Bay	Fecal Coliform
Falmouth	MA96-53	Perch Pond	Fecal Coliform
Falmouth	MA96-54	Great Pond	Fecal Coliform
Falmouth	MA96-55	Green Pond	Fecal Coliform
Falmouth	MA96-56	Little Pond	Fecal Coliform
Falmouth	MA96-57	Bournes Pond	Fecal Coliform
Falmouth	MA96-58	Hamblin Pond	Fecal Coliform
Falmouth	MA96-62	Oyster Pond	Fecal Coliform
Foxborough	MA62-39	Rumford River	Escherichia Coli (E. Coli)
Foxborough	MA62-47	Wading River	Escherichia Coli (E. Coli)
Foxborough	MA73-01	Neponset River	Fecal Coliform

Foxborough	MA73-01	Neponset River	Escherichia Coli (E. Coli)
Franklin	MA72-04	Charles River	Pathogens
Freetown	MA62-04	Taunton River	Fecal Coliform
Freetown	MA62-20	Assonet River	Fecal Coliform
Gloucester	MA93-12	Annisquam River	Fecal Coliform
Gloucester	MA93-16	Essex Bay	Fecal Coliform
Gloucester	MA93-18	Gloucester Harbor	Fecal Coliform
Gloucester	MA93-28	Mill River	Fecal Coliform
Hanover	MA94-05	North River	Fecal Coliform
Hanover	MA94-21	Drinkwater River	Escherichia Coli (E. Coli)
Hanover	MA94-24	Iron Mine Brook	Escherichia Coli (E. Coli)
Hanover	MA94-27	Third Herring Brook	Escherichia Coli (E. Coli)
Hanson	MA62-33	Shumatuscant River	Escherichia Coli (E. Coli)
Harwich	MA96-22	Herring River	Fecal Coliform
Harwich	MA96-23	Saquatucket Harbor	Fecal Coliform
Harwich	MA96-51	Muddy Creek	Pathogens
Holliston	MA72-16	Bogastow Brook	Pathogens
Hopedale	MA72-03	Charles River	Pathogens
Hopkinton	MA72-01	Charles River	Pathogens
Ipswich	MA93-16	Essex Bay	Fecal Coliform
Kingston	MA94-14	Jones River	Fecal Coliform
Kingston	MA94-15	Duxbury Bay	Fecal Coliform
Lawrence	MA83-19	Shawsheen River	Fecal Coliform
Lexington	MA72-28	Beaver Brook	Pathogens
Lexington	MA83-06	Vine Brook	Fecal Coliform
Lexington	MA83-10	Kiln Brook	Fecal Coliform
Lincoln	MA83-05	Elm Brook	Fecal Coliform
Lincoln	MA83-08	Shawsheen River	Fecal Coliform
Lynn	MA93-24	Nahant Bay	Fecal Coliform
Lynn	MA93-44	Saugus River	Fecal Coliform
Lynn	MA93-52	Lynn Harbor	Fecal Coliform
Lynnfield	MA93-30	Beaverdam Brook	Escherichia Coli (E. Coli)
Lynnfield	MA93-32	Hawkes Brook	Escherichia Coli (E. Coli)
Lynnfield	MA93-34	Saugus River	Escherichia Coli (E. Coli)
Lynnfield	MA93-35	Saugus River	Escherichia Coli (E. Coli)
Malden	MA93-51	Unnamed Tributary	Enterococcus Bacteria
Manchester	MA93-19	Manchester Harbor	Fecal Coliform
Manchester	MA93-25	Salem Sound	Fecal Coliform
Manchester	MA93-29	Cat Brook	Escherichia Coli (E. Coli)
Manchester	MA93-47	Causeway Brook	Escherichia Coli (E. Coli)
Mansfield	MA62-39	Rumford River	Escherichia Coli (E. Coli)

Mansfield	MA62-47	Wading River	Escherichia Coli (E. Coli)
Mansfield	MA62-49	Wading River	Escherichia Coli (E. Coli)
Marblehead	MA93-21	Salem Harbor	Fecal Coliform
Marblehead	MA93-22	Marblehead Harbor	Fecal Coliform
Marblehead	MA93-25	Salem Sound	Fecal Coliform
Marion	MA95-05	Weweantic River	Fecal Coliform
Marion	MA95-07	Sippican River	Fecal Coliform
Marion	MA95-08	Sippican Harbor	Fecal Coliform
Marion	MA95-09	Aucoot Cove	Fecal Coliform
Marion	MA95-56	Hammett Cove	Fecal Coliform
Marshfield	MA94-05	North River	Fecal Coliform
Marshfield	MA94-06	North River	Fecal Coliform
Marshfield	MA94-09	South River	Fecal Coliform
Marshfield	MA94-11	Green Harbor	Fecal Coliform
Mashpee	MA96-08	Shoestring Bay	Fecal Coliform
Mashpee	MA96-21	Waquoit Bay	Fecal Coliform
Mashpee	MA96-24	Mashpee River	Fecal Coliform
Mashpee	MA96-39	Popponeset Creek	Fecal Coliform
Mashpee	MA96-58	Hamblin Pond	Fecal Coliform
Mashpee	MA96-61	Little River	Fecal Coliform
Mashpee	MA96-92	Santuit River	Fecal Coliform
Mattapoisett	MA95-09	Aucoot Cove	Fecal Coliform
Mattapoisett	MA95-10	Hiller Cove	Fecal Coliform
Mattapoisett	MA95-35	Mattapoisett Harbor	Fecal Coliform
Mattapoisett	MA95-60	Mattapoisett River	Fecal Coliform
Mattapoisett	MA95-61	Eel Pond	Fecal Coliform
Mattapoisett	MA95-65	Nasketucket Bay	Fecal Coliform
Medfield	MA72-05	Charles River	Pathogens
Medfield	MA72-10	Stop River	Pathogens
Medfield	MA73-09	Mine Brook	Fecal Coliform
Medway	MA72-04	Charles River	Pathogens
Medway	MA72-05	Charles River	Pathogens
Melrose	MA93-48	Bennetts Pond Brook	Escherichia Coli (E. Coli)
Mendon	MA72-03	Charles River	Pathogens
Milford	MA72-01	Charles River	Pathogens
Millis	MA72-05	Charles River	Pathogens
Millis	MA72-16	Bogastow Brook	Pathogens
Milton	MA73-02	Neponset River	Fecal Coliform
Milton	MA73-03	Neponset River	Fecal Coliform
Milton	MA73-04	Neponset River	Fecal Coliform
Milton	MA73-26	Unquity Brook	Fecal Coliform

Milton	MA73-29	Pine Tree Brook	Fecal Coliform
Milton	MA73-30	Gulliver Creek	Fecal Coliform
Nahant	MA93-24	Nahant Bay	Fecal Coliform
Nahant	MA93-52	Lynn Harbor	Fecal Coliform
Nahant	MA93-53	Lynn Harbor	Fecal Coliform
Natick	MA72-05	Charles River	Pathogens
Natick	MA72-06	Charles River	Pathogens
Needham	MA72-06	Charles River	Pathogens
Needham	MA72-07	Charles River	Pathogens
Needham	MA72-18	Fuller Brook	Pathogens
Needham	MA72-21	Rock Meadow Brook	Pathogens
Needham	MA72-25	Rosemary Brook	Pathogens
New Bedford	MA95-13	Buttonwood Brook	Escherichia Coli (E. Coli)
New Bedford	MA95-33	Acushnet River	Fecal Coliform
New Bedford	MA95-38	Clarks Cove	Fecal Coliform
New Bedford	MA95-42	New Bedford Inner Harbor	Fecal Coliform
New Bedford	MA95-63	Outer New Bedford Harbor	Fecal Coliform
Newton	MA72-07	Charles River	Pathogens
Newton	MA72-23	Sawmill Brook	Pathogens
Newton	MA72-24	South Meadow Brook	Pathogens
Newton	MA72-29	Cheese Cake Brook	Pathogens
Newton	MA72-36	Charles River	Pathogens
Norfolk	MA72-05	Charles River	Pathogens
Norfolk	MA72-10	Stop River	Pathogens
North Andover	MA83-19	Shawsheen River	Fecal Coliform
Norton	MA62-49	Wading River	Escherichia Coli (E. Coli)
Norton	MA62-56	Three Mile River	Escherichia Coli (E. Coli)
Norwell	MA94-05	North River	Fecal Coliform
Norwell	MA94-27	Third Herring Brook	Escherichia Coli (E. Coli)
Norwell	MA94-31	Second Herring Brook	Fecal Coliform
Norwood	MA73-01	Neponset River	Fecal Coliform
Norwood	MA73-01	Neponset River	Escherichia Coli (E. Coli)
Norwood	MA73-02	Neponset River	Fecal Coliform
Norwood	MA73-15	Germany Brook	Fecal Coliform
Norwood	MA73-16	Hawes Brook	Fecal Coliform
Norwood	MA73-17	Traphole Brook	Fecal Coliform
Norwood	MA73-24	Purgatory Brook	Fecal Coliform
Norwood	MA73-33	Unnamed Tributary	Escherichia Coli (E. Coli)
Orleans	MA96-16	Rock Harbor Creek	Fecal Coliform
Orleans	MA96-26	Little Namskaket Creek	Fecal Coliform
Orleans	MA96-27	Namskaket Creek	Fecal Coliform

Orleans	MA96-68	Town Cove	Fecal Coliform
Orleans	MA96-72	Paw Wah Pond	Fecal Coliform
Orleans	MA96-73	Pochet Neck	Fecal Coliform
Orleans	MA96-76	The River	Fecal Coliform
Orleans	MA96-78	Little Pleasant Bay	Fecal Coliform
Peabody	MA93-01	Waters River	Fecal Coliform
Peabody	MA93-05	Goldthwait Brook	Escherichia Coli (E. Coli)
Peabody	MA93-39	Proctor Brook	Escherichia Coli (E. Coli)
Pembroke	MA94-05	North River	Fecal Coliform
Plymouth	MA94-15	Duxbury Bay	Fecal Coliform
Plymouth	MA94-16	Plymouth Harbor	Fecal Coliform
Plymouth	MA94-34	Ellisville Harbor	Fecal Coliform
Raynham	MA62-02	Taunton River	Fecal Coliform
Rehoboth	MA53-03	Palmer River	Pathogens
Rehoboth	MA53-04	Palmer River	Pathogens
Rehoboth	MA53-05	Palmer River	Pathogens
Rehoboth	MA53-07	Palmer River - West Branch	Pathogens
Rehoboth	MA53-08	Palmer River - East Branch	Pathogens
Rehoboth	MA53-09	Rumney Marsh Brook	Pathogens
Rehoboth	MA53-10	Beaver Dam Brook	Pathogens
Rehoboth	MA53-11	Bad Luck Brook	Pathogens
Rehoboth	MA53-12	Fullers Brook	Pathogens
Rehoboth	MA53-13	Clear Run Brook	Pathogens
Rehoboth	MA53-14	Torrey Creek	Pathogens
Rehoboth	MA53-15	Old Swamp Brook	Pathogens
Rehoboth	MA53-16	Rocky Run	Pathogens
Revere	MA93-15	Pines River	Fecal Coliform
Revere	MA93-44	Saugus River	Fecal Coliform
Revere	MA93-51	Unnamed Tributary	Enterococcus Bacteria
Revere	MA93-52	Lynn Harbor	Fecal Coliform
Revere	MA93-53	Lynn Harbor	Fecal Coliform
Rockland	MA94-03	French Stream	Escherichia Coli (E. Coli)
Rockport	MA93-17	Rockport Harbor	Fecal Coliform
Salem	MA93-09	Danvers River	Fecal Coliform
Salem	MA93-20	Beverly Harbor	Fecal Coliform
Salem	MA93-21	Salem Harbor	Fecal Coliform
Salem	MA93-25	Salem Sound	Fecal Coliform
Salem	MA93-39	Proctor Brook	Escherichia Coli (E. Coli)
Salem	MA93-40	Proctor Brook	Enterococcus Bacteria
Salem	MA93-42	North River	Fecal Coliform
Sandwich	MA95-14	Cape Cod Canal	Fecal Coliform

Sandwich	MA96-30	Scorton Creek	Fecal Coliform
Sandwich	MA96-84	Old Harbor Creek	Fecal Coliform
Sandwich	MA96-85	Mill Creek	Fecal Coliform
Sandwich	MA96-86	Dock Creek	Fecal Coliform
Sandwich	MA96-87	Springhill Creek	Fecal Coliform
Saugus	MA93-15	Pines River	Fecal Coliform
Saugus	MA93-33	Hawkes Brook	Escherichia Coli (E. Coli)
Saugus	MA93-35	Saugus River	Escherichia Coli (E. Coli)
Saugus	MA93-43	Saugus River	Fecal Coliform
Saugus	MA93-44	Saugus River	Fecal Coliform
Saugus	MA93-48	Bennetts Pond Brook	Escherichia Coli (E. Coli)
Saugus	MA93-49	Shute Brook	Fecal Coliform
Saugus	MA93-50	Shute Brook	Escherichia Coli (E. Coli)
Scituate	MA94-01	Cohasset Harbor	Fecal Coliform
Scituate	MA94-02	Scituate Harbor	Fecal Coliform
Scituate	MA94-05	North River	Fecal Coliform
Scituate	MA94-06	North River	Fecal Coliform
Scituate	MA94-07	Herring River	Fecal Coliform
Scituate	MA94-09	South River	Fecal Coliform
Scituate	MA94-19	The Gulf	Fecal Coliform
Scituate	MA94-32	Cohasset Cove	Fecal Coliform
Scituate	MA94-33	Musquashcut Pond	Fecal Coliform
Seekonk	MA53-01	Runnins River	Fecal Coliform
Seekonk	MA53-12	Fullers Brook	Pathogens
Seekonk	MA53-13	Clear Run Brook	Pathogens
Seekonk	MA53-14	Torrey Creek	Pathogens
Sharon	MA62-39	Rumford River	Escherichia Coli (E. Coli)
Sharon	MA73-17	Traphole Brook	Fecal Coliform
Sharon	MA73-31	Unnamed Tributary	Fecal Coliform
Sherborn	MA72-05	Charles River	Pathogens
Somerset	MA61-01	Lee River	Fecal Coliform
Somerset	MA61-02	Lee River	Fecal Coliform
Somerset	MA61-06	Mount Hope Bay	Fecal Coliform
Somerset	MA62-03	Taunton River	Fecal Coliform
Somerset	MA62-04	Taunton River	Fecal Coliform
Somerset	MA62-50	Broad Cove	Fecal Coliform
Stoughton	MA73-20	Beaver Meadow Brook	Fecal Coliform
Stoughton	MA73-32	Unnamed Tributary	Escherichia Coli (E. Coli)
Swampscott	MA93-24	Nahant Bay	Fecal Coliform
Swansea	MA53-03	Palmer River	Pathogens
Swansea	MA53-06	Warren River Pond	Fecal Coliform

Swansea	MA53-16	Rocky Run	Pathogens
Swansea	MA61-01	Lee River	Fecal Coliform
Swansea	MA61-02	Lee River	Fecal Coliform
Swansea	MA61-04	Cole River	Fecal Coliform
Swansea	MA61-07	Mount Hope Bay	Fecal Coliform
Swansea	MA61-08	Kickemuit River	Pathogens
Taunton	MA62-02	Taunton River	Fecal Coliform
Taunton	MA62-56	Three Mile River	Escherichia Coli (E. Coli)
Taunton	MA62-57	Three Mile River	Fecal Coliform
Tewksbury	MA83-07	Strong Water Brook	Fecal Coliform
Tewksbury	MA83-15	Unnamed Tributary	Fecal Coliform
Tewksbury	MA83-18	Shawsheen River	Fecal Coliform
Wakefield	MA93-31	Mill River	Escherichia Coli (E. Coli)
Wakefield	MA93-34	Saugus River	Escherichia Coli (E. Coli)
Wakefield	MA93-35	Saugus River	Escherichia Coli (E. Coli)
Walpole	MA72-10	Stop River	Pathogens
Walpole	MA73-01	Neponset River	Fecal Coliform
Walpole	MA73-01	Neponset River	Escherichia Coli (E. Coli)
Walpole	MA73-06	School Meadow Brook	Fecal Coliform
Walpole	MA73-09	Mine Brook	Fecal Coliform
Walpole	MA73-17	Traphole Brook	Fecal Coliform
Waltham	MA72-07	Charles River	Pathogens
Waltham	MA72-28	Beaver Brook	Pathogens
Wareham	MA95-01	Buttermilk Bay	Fecal Coliform
Wareham	MA95-02	Onset Bay	Fecal Coliform
Wareham	MA95-03	Wareham River	Fecal Coliform
Wareham	MA95-05	Weweantic River	Fecal Coliform
Wareham	MA95-07	Sippican River	Fecal Coliform
Wareham	MA95-29	Agawam River	Fecal Coliform
Wareham	MA95-49	Broad Marsh River	Fecal Coliform
Wareham	MA95-50	Wankinco River	Fecal Coliform
Wareham	MA95-51	Crooked River	Fecal Coliform
Wareham	MA95-52	Cedar Island Creek	Fecal Coliform
Wareham	MA95-53	Beaverdam Creek	Fecal Coliform
Watertown	MA72-07	Charles River	Pathogens
Watertown	MA72-30	Unnamed Tributary	Pathogens
Watertown	MA72-32	Unnamed Tributary	Pathogens
Watertown	MA72-36	Charles River	Pathogens
Wellesley	MA72-06	Charles River	Pathogens
Wellesley	MA72-07	Charles River	Pathogens
Wellesley	MA72-18	Fuller Brook	Pathogens

Wellesley	MA72-25	Rosemary Brook	Pathogens
Wellfleet	MA96-32	Duck Creek	Fecal Coliform
Wellfleet	MA96-33	Herring River	Fecal Coliform
Wellfleet	MA96-34	Wellfleet Harbor	Fecal Coliform
West Bridgewater	MA62-06	Salisbury Plain River	Escherichia Coli (E. Coli)
Weston	MA72-07	Charles River	Pathogens
Westport	MA95-37	West Branch Westport River	Fecal Coliform
Westport	MA95-40	East Branch Westport River	Escherichia Coli (E. Coli)
Westport	MA95-41	East Branch Westport River	Fecal Coliform
Westport	MA95-44	Snell Creek	Escherichia Coli (E. Coli)
Westport	MA95-45	Snell Creek	Escherichia Coli (E. Coli)
Westport	MA95-54	Westport River	Fecal Coliform
Westport	MA95-58	Bread And Cheese Brook	Escherichia Coli (E. Coli)
Westport	MA95-59	Snell Creek	Fecal Coliform
Westwood	MA72-21	Rock Meadow Brook	Pathogens
Westwood	MA73-02	Neponset River	Fecal Coliform
Westwood	MA73-15	Germany Brook	Fecal Coliform
Westwood	MA73-24	Purgatory Brook	Fecal Coliform
Westwood	MA73-25	Pecunit Brook	Escherichia Coli (E. Coli)
Westwood	MA73-27	Ponkapog Brook	Fecal Coliform
Whitman	MA62-09	Beaver Brook	Escherichia Coli (E. Coli)
Whitman	MA62-33	Shumatuscasant River	Escherichia Coli (E. Coli)
Whitman	MA62-38	Meadow Brook	Escherichia Coli (E. Coli)
Wilmington	MA83-18	Shawsheen River	Fecal Coliform
Winthrop	MA93-53	Lynn Harbor	Fecal Coliform
Yarmouth	MA96-12	Bass River	Fecal Coliform
Yarmouth	MA96-35	Chase Garden Creek	Fecal Coliform
Yarmouth	MA96-36	Lewis Bay	Fecal Coliform
Yarmouth	MA96-37	Mill Creek	Fecal Coliform
Yarmouth	MA96-38	Parkers River	Fecal Coliform
Yarmouth	MA96-80	Mill Creek	Fecal Coliform
Yarmouth	MA96-82	Hyannis Inner Harbor	Fecal Coliform

**Table F-8: Bacteria or pathogens impaired waterbody names and segment IDs along with primary municipality and indicator organism identified by the applicable TMDL. The term primary municipality indicates the municipality in which the majority of the segment is located, but does not necessarily indicate each municipality that has regulated discharges to the waterbody segment.**

2. At any time during the permit term the permittee may be relieved of additional requirements in Appendix F part A.III.1. as follows:
  - a. The permittee is relieved of additional requirements as of the date when the following conditions are met:
    - i. The applicable TMDL has been modified, revised or withdrawn and EPA has approved a new TMDL applicable to the receiving water

- that indicates that no additional stormwater controls for bacteria/pathogens are necessary for the permittee's discharge based on wasteload allocations in the newly approved TMDL
- b. In such a case, the permittee shall document the date of the approved TMDL in its SWMP and is relieved of any additional remaining requirements of Appendix F part A.III.1 as of that date and the permittee shall comply with the following:
    - i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix F part A.III.1 to date to reduce bacteria/pathogens in their discharges including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
    - ii. The permittee shall continue to implement all requirements of Appendix F part A.III.1 required to be implemented prior to the date of the newly approved TMDL, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications.

#### IV. Cape Cod Nitrogen TMDL Requirements

There are 19 approved TMDLs for nitrogen for various watersheds, ponds and bays on Cape Cod.<sup>15</sup> The following measures are needed to ensure that current nitrogen loads from MS4 stormwater discharged into the impaired waterbodies do not increase.

1. The operators of traditional and non-traditional MS4s located in municipalities listed in Table F-9 or any other MS4 (traditional and non-traditional) that discharges to any waterbody listed in Table F-9 or their tributaries shall comply with the following BMPs in addition to the requirements of part 2.3 of the Permit, as described below:
  - a. Enhanced BMPs
    - i. Enhancement of BMPs required by part 2.3 of the permit that shall be implemented during this permit term:
      1. part 2.3.2, Public education and outreach: The permittee shall supplement its Residential and Business/Commercial/Institution program with annual timed messages on specific topics. The permittee shall distribute an annual message in the spring (April/May) timeframe that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release fertilizers. The permittee shall distribute an annual message in the summer (June/July) timeframe encouraging the proper management of pet waste, including noting any existing ordinances where appropriate. The permittee shall distribute an annual message in the Fall (August/September/October) timeframe encouraging the proper disposal of leaf litter. The permittee shall deliver an annual message on each of these topics, unless the permittee determines that one or more of these issues is not a significant contributor of nitrogen to discharges from the MS4 and the permittee retains documentation of this finding in the SWMP. All public education messages can be combined with requirements of Appendix H part I, II and III as well as Appendix F part A.III, A.V, B.I, B.II and B.III where appropriate.
      2. part 2.3.6, 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; retrofit inventory and priority ranking under 2.3.6.1.b shall include consideration of BMPs to reduce nitrogen discharges.

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<sup>15</sup> Final nitrogen TMDLs for Cape Cod can be found here:

<http://www.mass.gov/eea/agencies/massdep/water/watersheds/total-maximum-daily-loads-tmdls.html>

3. part 2.3.7, Good House Keeping and Pollution Prevention for Permittee Owned Operations: establish requirements for use of slow release fertilizers on permittee owned property currently using fertilizer, in addition to reducing and managing fertilizer use as provided in in part 2.3.7.1; establish procedures to properly manage grass cuttings and leaf litter on permittee property, including prohibiting blowing organic waste materials onto adjacent impervious surfaces; 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 (2) times per year, once in the spring (following winter activities such as sanding) and at least once in the fall (Sept 1 – Dec 1; following leaf fall).

<b>Municipality</b>	<b>Waterbody Name</b>
Barnstable	Centerville River
Barnstable	Popponesset Bay
Barnstable	Shoestring Bay
Barnstable	Cotuit Bay
Barnstable	North Bay
Barnstable	Prince Cove
Barnstable	West Bay
Barnstable	Hyannis Inner Harbor
Barnstable	Lewis Bay
Bourne	Phinneys Harbor
Chatham	Crows Pond
Chatham	Bucks Creek
Chatham	Harding Beach Pond
Chatham	Mill Creek
Chatham	Mill Pond
Chatham	Oyster Pond
Chatham	Oyster Pond River
Chatham	Stage Harbor
Chatham	Taylor's Pond
Chatham	Frost Fish Creek
Chatham	Ryder Cove
Falmouth	Bournes Pond
Falmouth	Great Pond
Falmouth	Green Pond
Falmouth	Perch Pond
Falmouth	Little Pond
Falmouth	Oyster Pond
Falmouth	Quashnet River
Falmouth	Inner West Falmouth Harbor

<b>Municipality</b>	<b>Waterbody Name</b>
Falmouth	West Falmouth Harbor
Falmouth	Snug Harbor
Falmouth	Harbor Head
Harwich	Muddy Creek - Lower
Harwich	Muddy Creek - Upper
Harwich	Round Cove
Mashpee	Mashpee River
Mashpee	Great River
Mashpee	Hamblin Pond
Mashpee	Jehu Pond
Mashpee	Little River
Orleans	Areys Pond
Orleans	Little Pleasant Bay
Orleans	Namequoit River
Orleans	Paw Wah Pond
Orleans	Pleasant Bay
Orleans	Pochet Neck
Orleans	Quanset Pond
Yarmouth	Mill Creek
Yarmouth	Hyannis Inner Harbor
Yarmouth	Lewis Bay

**Table F-9: Waterbodies subject to a Cape Cod nitrogen TMDL and the primary municipalities**

2. At any time during the permit term the permittee may be relieved of additional requirements in Appendix F part A.IV.1. applicable to it when in compliance with this part.
  - a. The permittee is relieved of its additional requirements as of the date when one of the following criteria are met:
    - i. The applicable TMDL has been modified, revised or withdrawn and EPA has approved a new TMDL applicable for the receiving water that indicates that no additional stormwater controls for the control of nitrogen are necessary for the permittee’s discharge based on wasteload allocations in the newly approved TMDL
  - b. In such a case, the permittee shall document the date of the approved TMDL in its SWMP and is relieved of any remaining requirements of Appendix F part A.IV.1 as of that date and the permittee shall comply with the following:
    - i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix F part A.IV.1 to date to reduce nitrogen in their discharges including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
    - ii. The permittee shall continue to implement all requirements of Appendix F part A.IV.1 required to be implemented prior to the date of the newly approved TMDL, including ongoing

implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications.

## V. Assabet River Phosphorus TMDL Requirements

On September 23, 2004 EPA approved the *Assabet River Total Maximum Daily Load for Total Phosphorus*<sup>16</sup>. The following measures are needed to ensure that current phosphorus loads from MS4 stormwater discharged directly or indirectly via tributaries into the Assabet River do not increase.

1. The operators of traditional and non-traditional MS4s located in municipalities listed in Table F-10 within the Assabet River Watershed shall comply with the following BMPs in addition to the requirements of part 2.3 of the Permit, as described below:
  - a. Enhanced BMPs
    - i. Enhancement of BMPs required by part 2.3 of the permit that shall be implemented during this permit term:
      1. part 2.3.2, Public education and outreach: The permittee shall supplement its Residential and Business/Commercial/Institution program with annual timed messages on specific topics. The permittee shall distribute an annual message in the spring (March/April) timeframe that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release and phosphorous-free fertilizers. The permittee shall distribute an annual message in the summer (June/July) timeframe encouraging the proper management of pet waste, including noting any existing ordinances where appropriate. The permittee shall distribute an annual message in the fall (August/September/October) timeframe encouraging the proper disposal of leaf litter. The permittee shall deliver an annual message on each of these topics, unless the permittee determines that one or more of these issues is not a significant contributor of phosphorous to discharges from the MS4 and the permittee retains documentation of this finding in the SWMP. All public education messages can be combined with requirements of Appendix H part I, II and III as well as Appendix F part A.III, A.IV, B.I, B.II and B.III where appropriate.
      2. part 2.3.6, 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 phosphorus removal; retrofit inventory and priority ranking under 2.3.6.1.b shall include consideration of BMPs that infiltrate stormwater where feasible.
      3. part 2.3.7, Good House Keeping and Pollution Prevention for Permittee Owned Operations: Establish program to properly

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<sup>16</sup> Massachusetts Department of Environmental Protection, 2004. *Assabet River Total Maximum Daily Load for Total Phosphorus*. CN 201.0

manage grass cuttings and leaf litter on permittee property, including prohibiting blowing organic waste materials onto adjacent impervious surfaces; 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, once in the spring (following winter activities such as sanding) and at least once in the fall (Sept 1 – Dec 1; following leaf fall).

<b>Municipality</b>
Acton
Berlin
Bolton
Boxborough
Boylston
Carlisle
Clinton
Concord
Grafton
Harvard
Hudson
Littleton
Marlborough
Maynard
Northborough
Shrewsbury
Stow
Westborough
Westford

**Table F-10: Municipalities located in the Assabet River Watershed**

2. At any time during the permit term the permittee may be relieved of additional requirements in Appendix F part A.V.1. as follows.
  - a. The permittee is relieved of its additional requirements as of the date when following conditions are met:
    - i. The applicable TMDL has been modified, revised or withdrawn and EPA has approved a new TMDL applicable for the receiving water that indicates that no additional stormwater controls for the control of phosphorus are necessary for the permittee’s discharge based on wasteload allocations in the newly approved TMDL
  - b. In such a case, the permittee shall document the date of the approved TMDL in its SWMP and is relieved of any remaining requirements of Appendix F part A.V.1 as of that date and the permittee shall comply with the following:
    - i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix F part A.V.1 to

date to reduce phosphorus in their discharges including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs

- ii. The permittee shall continue to implement all requirements of Appendix F part A.V.1 required to be implemented prior to the date of the newly approved TMDL including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications.

## **B. Requirements for Discharges to Impaired Waters with an Approved Out of State TMDL**

### **I. Nitrogen TMDL Requirements**

Discharges from MS4s in Massachusetts to waters that are tributaries to the Long Island Sound, which has an approved TMDL for nitrogen<sup>17</sup>, are subject to the requirements of this part.

1. The operators of traditional and non-traditional MS4s located in municipalities listed in Table F-11 shall comply with the following BMPs in addition to the requirements of part 2.3 of the Permit, as described below:
  - a. Enhanced BMPs
    - i. Enhancement of BMPs required by part 2.3 of the permit that shall be implemented during this permit term:
      1. part 2.3.2, Public education and outreach: The permittee shall supplement its Residential and Business/Commercial/Institution program with annual timed messages on specific topics. The permittee shall distribute an annual message in the spring (April/May) timeframe that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release fertilizers. The permittee shall distribute an annual message in the summer (June/July) timeframe encouraging the proper management of pet waste, including noting any existing ordinances where appropriate. The permittee shall distribute an annual message in the Fall (August/September/October) timeframe encouraging the proper disposal of leaf litter. The permittee shall deliver an annual message on each of these topics, unless the permittee determines that one or more of these issues is not a significant contributor of nitrogen to discharges from the MS4 and the permittee retains documentation of this finding in the SWMP. All public education messages can be combined with requirements of Appendix H part I, II and III as well as Appendix F part A.III, A.IV, A.V, B.II and B.III where appropriate.
      2. part 2.3.6, 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; retrofit inventory and priority ranking under 2.3.6.1.b shall include consideration of BMPs to reduce nitrogen discharges.
      3. part 2.3.7, Good House Keeping and Pollution Prevention for Permittee Owned Operations: establish requirements for use of

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<sup>17</sup> Connecticut Department of Environmental Protection. 2000. *A Total Maximum Daily Load Analysis to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound*

slow release fertilizers on permittee owned property currently using fertilizer, in addition to reducing and managing fertilizer use as provided in in part 2.3.7.1; establish procedures to properly manage grass cuttings and leaf litter on permittee property, including prohibiting blowing organic waste materials onto adjacent impervious surfaces; 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 (2) times per year, once in the spring (following winter activities such as sanding) and at least once in the fall (Sept 1 – Dec 1; following leaf fall).

b. Nitrogen Source Identification Report

- i. Within four years of the permit effective date the permittee shall complete a Nitrogen Source Identification Report. The report shall include the following elements:
  1. Calculation of total urbanized area within the permittee's jurisdiction that is within the Connecticut River Watershed, the Housatonic River Watershed, or the Thames River Watershed, incorporating updated mapping of the MS4 and catchment delineations produced pursuant to part 2.3.4.6,
  2. All screening and monitoring results pursuant to part 2.3.4.7.d., targeting the receiving water segment(s)
  3. Impervious area and DCIA for the target catchment
  4. Identification, delineation and prioritization of potential catchments with high nitrogen loading
  5. Identification of potential retrofit opportunities or opportunities for the installation of structural BMPs during re-development
- ii. The final Nitrogen Source Identification Report shall be submitted to EPA as part of the year 4 annual report.

c. Structural BMPs

- i. Within five years of the permit effective date, the permittee shall evaluate all 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. The evaluation shall include:
  1. The next planned infrastructure, resurfacing or redevelopment activity planned for the property (if applicable) OR planned retrofit date;
  2. The estimated cost of redevelopment or retrofit BMPs; and
  3. The engineering and regulatory feasibility of redevelopment or retrofit BMPs.
- ii. The permittee shall provide a listing of planned structural BMPs and a plan and schedule for implementation in the year 5 annual

report. The permittee shall plan and install a minimum of one structural BMP as a demonstration project within six years of the permit effective date. The demonstration project shall be installed targeting a catchment with high nitrogen load potential. The permittee shall install the remainder of the structural BMPs in accordance with the plan and schedule provided in the year 5 annual report.

- iii. Any structural BMPs listed in Table 4-3 of Attachment 1 to Appendix H installed in the urbanized 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 permittee shall document 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 in each annual report.

Adams	North Adams
Agawam	Northampton
Amherst	Oxford
Ashburnham	Palmer
Ashby	Paxton
Auburn	Pelham
Belchertown	Pittsfield
Charlton	Richmond
Cheshire	Russell
Chicopee	Rutland
Dalton	South Hadley
Douglas	Southampton
Dudley	Southbridge
East Longmeadow	Southwick
Easthampton	Spencer
Gardner	Springfield
Granby	Sturbridge
Hadley	Sutton
Hampden	Templeton
Hatfield	Ware
Hinsdale	Webster
Holyoke	West Springfield
Lanesborough	Westfield
Leicester	Westhampton
Lenox	Westminster
Longmeadow	Wilbraham
Ludlow	Williamsburg
Millbury	Winchendon

Monson	
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**Table F-11: Massachusetts municipalities in which MS4 discharges are within the Connecticut River Watershed, the Housatonic River Watershed, or the Thames River Watershed.**

2. At any time during the permit term the permittee may be relieved of additional requirements in Appendix F part B.I.1. as follows:
  - a. The permittee is relieved of its additional requirements as of the date when the following conditions are met:
    - i. The applicable TMDL has been modified, revised or withdrawn and EPA has approved a new TMDL applicable for the receiving water that indicates that no additional stormwater controls for the control of nitrogen are necessary for the permittee’s discharge based on wasteload allocations in the newly approved TMDL
  - b. In such a case, the permittee shall document the date of the approved TMDL in its SWMP and is relieved of any remaining requirements of Appendix F part B.I.1 as of that date and the permittee shall comply with the following:
    - i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix F part B.I.1 to date to reduce nitrogen in their discharges including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
    - ii. The permittee shall continue to implement all requirements of Appendix F part B.I.1 required to be implemented prior to the date of the newly approved TMDL, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications.

## II. Phosphorus TMDL Requirements

There are currently eight approved phosphorus TMDLs for certain waterbody segments in Rhode Island that identify urban stormwater discharges in Massachusetts as sources that are contributing phosphorus to the impaired segments. The TMDLs include the Kickemuit Reservoir, Upper Kickemuit River, Kickemuit River, Ten Mile River, Central Pond, Turner Reservoir, Lower Ten Mile River, and Omega Pond TMDLs<sup>18</sup>. Table F-12 lists municipalities in Massachusetts identified in the TMDLs as containing MS4s contributing phosphorus to the impaired waterbody segments in Rhode Island, the impaired receiving water, and the approved TMDL name. Any permittee (traditional or non-traditional) that operates an MS4 in a municipality listed in Table F-12 and that discharges to a waterbody or tributary of a waterbody listed on Table F-12 is subject to the requirements of this part.

1. The operators of traditional and non-traditional MS4s located in municipalities listed in Table F-12 and that discharge to a waterbody or a tributary of a waterbody identified on Table F-12 shall comply with the following BMPs in addition to the requirements of part 2.3 of the Permit, as described below:
  - a. Enhanced BMPs
    - i. Enhancement of BMPs required by part 2.3 of the permit that shall be implemented during this permit term:
      1. part 2.3.2, Public education and outreach: The permittee shall supplement its Residential and Business/Commercial/Institution program with annual timed messages on specific topics. The permittee shall distribute an annual message in the spring (March/April) timeframe that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release and phosphorous-free fertilizers. The permittee shall distribute an annual message in the summer (June/July) timeframe encouraging the proper management of pet waste, including noting any existing ordinances where appropriate. The permittee shall distribute an annual message in the fall (August/September/October) timeframe encouraging the proper disposal of leaf litter. The permittee shall deliver an annual message on each of these topics, unless the permittee determines that one or more of these issues is not a significant contributor of phosphorous to discharges from the MS4 and the permittee retains documentation of this finding in the SWMP. All public education messages can be combined with requirements of Appendix H part I, II and III as well as Appendix F part A.III, A.IV, A.V, B.I, and B.III where appropriate.
      2. part 2.3.6, Stormwater Management in New Development and Redevelopment: the requirement for

<sup>18</sup> See <http://www.dem.ri.gov/programs/benviron/water/quality/rest/reports.htm> for all RI TMDL documents. (retrieved 6/30/2014)

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 phosphorus removal; retrofit inventory and priority ranking under 2.3.6.1.b shall include consideration of BMPs that infiltrate stormwater where feasible.

3. part 2.3.7, Good House Keeping and Pollution Prevention for Permittee Owned Operations: Establish program to properly manage grass cuttings and leaf litter on permittee property, including prohibiting blowing organic waste materials onto adjacent impervious surfaces; 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, once in the spring (following winter activities such as sanding) and at least once in the fall (Sept 1 – Dec 1; following leaf fall).

b. Phosphorus Source Identification Report

- i. Within four years of the permit effective date the permittee shall complete a Phosphorus Source Identification Report. The report shall include the following elements:
  1. Calculation of total urbanized area draining to the water quality limited receiving water segments or their tributaries, incorporating updated mapping of the MS4 and catchment delineations produced pursuant to part 2.3.4.6,
  2. All screening and monitoring results pursuant to part 2.3.4.7.d., targeting the receiving water segment(s)
  3. Impervious area and DCIA for the target catchment
  4. Identification, delineation and prioritization of potential catchments with high phosphorus loading
  5. Identification of potential retrofit opportunities or opportunities for the installation of structural BMPs during re development, including the removal of impervious area of permittee owned properties
- ii. The phosphorus source identification report shall be submitted to EPA as part of the year 4 annual report.

c. Structural BMPs

- i. Within five years of the permit effective date, the permittee shall 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 Phosphorus Source Identification Report that are within the drainage area of the water quality limited water or its tributaries. The evaluation shall include:

1. The next planned infrastructure, resurfacing or redevelopment activity planned for the property (if applicable) OR planned retrofit date;
  2. The estimated cost of redevelopment or retrofit BMPs; and
  3. The engineering and regulatory feasibility of redevelopment or retrofit BMPs.
- ii. The permittee shall provide a listing of planned structural BMPs and a plan and schedule for implementation in the year 5 annual report. The permittee shall plan and install a minimum of one structural BMP as a demonstration project within the drainage area of the water quality limited water or its tributaries within six years of the permit effective date. The demonstration project shall be installed targeting a catchment with high phosphorus load potential. The permittee shall install the remainder of the structural BMPs in accordance with the plan and schedule provided in the year 5 annual report.
- iii. Any structural BMPs installed in the urbanized area by the permittee or its agents shall be tracked and the permittee shall estimate the phosphorus removal by the BMP consistent with Attachment 3 to Appendix F. The permittee shall document the BMP type, total area treated by the BMP, the design storage volume of the BMP and the estimated phosphorus removed in mass per year by the BMP in each annual report.

<b>Municipality</b>	<b>Receiving Water</b>	<b>TMDL Name</b>
Attleboro	Upper Ten Mile River, Lower Ten Mile River, Central Pond, Omega Pond and Turner Reservoir	Total Maximum Daily Load Analysis For The Ten Mile River Watershed
North Attleborough	Upper Ten Mile River, Lower Ten Mile River, Central Pond, Omega Pond and Turner Reservoir	Total Maximum Daily Load Analysis For The Ten Mile River Watershed
Plainville	Upper Ten Mile River, Lower Ten Mile River, Central Pond, Omega Pond and Turner Reservoir	Total Maximum Daily Load Analysis For The Ten Mile River Watershed
Rehoboth	Upper Kikemuit River, Kickemuit River, Kickemuit Reservoir	Fecal Coliform and Total Phosphorus TMDLs:

Municipality	Receiving Water	TMDL Name
		Kickemuit Reservoir, Rhode Island (RI0007034L-01) Upper Kickemuit River (RI 0007034R-01) Kickemuit River (MA 61-08 2004)
Seekonk	Upper Ten Mile River, Lower Ten Mile River, Central Pond, Omega Pond and Turner Reservoir	Total Maximum Daily Load Analysis For The Ten Mile River Watershed
Swansea	Upper Kikemuit River, Kickemuit River, Kickemuit Reservoir	Fecal Coliform and Total Phosphorus TMDLs: Kickemuit Reservoir, Rhode Island (RI0007034L-01) Upper Kickemuit River (RI 0007034R-01) Kickemuit River (MA 61-08 2004)

Table F-12: Municipalities in Massachusetts identified in the TMDLs as containing MS4s contributing phosphorus to the impaired waterbody segments in Rhode Island, the impaired receiving water, and the approved TMDL name.

2. At any time during the permit term the permittee may be relieved of additional requirements in Appendix F part B.II.1. as follows:
  - a. The permittee is relieved of its additional requirements as of the date when one of the following criteria are met:
    - i. The applicable TMDL has been modified, revised or withdrawn and EPA has approved a new TMDL applicable for the receiving water that indicates that no additional stormwater controls for the control of phosphorus are necessary for the permittee’s discharge based on wasteload allocations in the newly approved TMDL
  - b. In such a case, the permittee shall document the date of the approved TMDL in its SWMP and is relieved of any remaining requirements of Appendix F part B.II.1 as of that date and the permittee shall comply with the following:
    - i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix F part B.II.1 to date to reduce phosphorus in their discharges including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
    - ii. The permittee shall continue to implement all requirements of Appendix F part B.II.1 required to be implemented prior to the date of the newly approved TMDL, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications.

### III. Bacteria and Pathogen TMDL Requirements

There are currently six approved bacteria (fecal coliform bacteria) or pathogen (fecal coliform and/or enterococcus bacteria) TMDLs for certain waterbody segments in Rhode Island that identify urban stormwater discharges in Massachusetts as sources that are contributing bacteria or pathogens to the impaired segments. The TMDLs include the Kickemuit Reservoir, Upper Kickemuit River, Ten Mile River, Lower Ten Mile River and Omega Pond TMDLs<sup>19</sup> Table F-13 lists municipalities in Massachusetts identified in the TMDLs as containing MS4s contributing bacteria or pathogens to the impaired waterbody segments in Rhode Island, the impaired receiving water, and the approved TMDL name. Any permittee (traditional or non-traditional) that operates an MS4 in a municipality listed in Table F-13 and that discharges to a waterbody or a tributary of a waterbody listed on Table F-13 is subject to the requirements of this part.

- 1) Traditional and non-traditional MS4s operating in the municipalities identified in Table F-13 and that discharge to a waterbody or a tributary of a waterbody identified on Table F-13 shall comply with the following BMPs in addition to the requirements of part 2.3 of the Permit, as described below::
  - a. Enhanced BMPs
    - i. Enhancement of BMPs required by part 2.3 of the permit that shall be implemented during this permit term:
      1. part 2.3.3. Public Education: The permittee shall supplement its Residential program with an annual message encouraging the proper management of pet waste, including noting any existing ordinances where appropriate. The permittee or its agents shall disseminate educational materials to dog owners at the time of issuance or renewal of a dog license, or other appropriate time. Education materials shall describe the detrimental impacts of improper management of pet waste, requirements for waste collection and disposal, and penalties for non-compliance. The permittee shall also provide information to owners of septic systems about proper maintenance in any catchment that discharges to a water body impaired for bacteria or pathogens. All public education messages can be combined with requirements of Appendix H part I, II and III as well as Appendix F part A.III, A.IV, A.V, B.I, and B.II where appropriate.
      2. part 2.3.4 Illicit Discharge: Catchments draining to any waterbody impaired for bacteria or pathogens shall be designated either Problem Catchments or HIGH priority in implementation of the IDDE program.

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<sup>19</sup> See <http://www.dem.ri.gov/programs/benviron/water/quality/rest/reports.htm> for all RI TMDL documents. (retrieved 6/30/2014)

<b>Municipality</b>	<b>Receiving Water</b>	<b>TMDL Name</b>
Attleboro	Upper Ten Mile River, Lower Ten Mile River, Omega Pond	Total Maximum Daily Load Analysis For The Ten Mile River Watershed
North Attleborough	Upper Ten Mile River, Lower Ten Mile River, Omega Pond	Total Maximum Daily Load Analysis For The Ten Mile River Watershed
Plainville	Upper Ten Mile River, Lower Ten Mile River, Omega Pond	Total Maximum Daily Load Analysis For The Ten Mile River Watershed
Rehoboth	Upper Kikemuit River, Kickemuit Reservoir	Fecal Coliform and Total Phosphorus TMDLs: Kickemuit Reservoir, Rhode Island (RI0007034L-01) Upper Kickemuit River (RI 0007034R-01) Kickemuit River (MA 61-08_2004)
Seekonk	Upper Ten Mile River, Lower Ten Mile River, Omega Pond	Total Maximum Daily Load Analysis For The Ten Mile River Watershed

**Table F-13: Municipalities in Massachusetts identified in the TMDLs as containing MS4s contributing bacteria or pathogens to the impaired waterbody segments in Rhode Island,, the impaired receiving water, and the approved TMDL name**

2. At any time during the permit term the permittee may be relieved of additional requirements in Appendix F part B.III.1. applicable to it when in compliance with this part.
  - a. The permittee is relieved of its additional requirements as of the date when one of the following criteria are met:
    - i. The applicable TMDL has been modified, revised or withdrawn and EPA has approved a new TMDL applicable for the receiving water that indicates that no additional stormwater controls for the control of bacteria/pathogens are necessary for the permittee’s discharge based on wasteload allocations in the newly approved TMDL
  - b. In such a case, the permittee shall document the date of the approved TMDL in its SWMP and is relieved of any remaining requirements of Appendix F part B.III.1 as of that date and the permittee shall comply with the following:
    - i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix F part B.III.1 to date to reduce bacteria/pathogens in their discharges including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
    - ii. The permittee shall continue to implement all requirements of Appendix F part B.III.1 required to be implemented prior to the date of the newly approved TMDL, including ongoing implementation

of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications.

#### IV. Metals TMDL Requirements

There are currently five approved metals TMDL for a waterbody segment in Rhode Island that identifies urban stormwater discharges in Massachusetts as sources that are contributing metals (Cadmium, Lead, Aluminum, Iron) to the impaired segment. The TMDLs include the Upper Ten Mile River, Lower Ten Mile River, Central Pond, Turner Reservoir and Omega Pond TMDLs.<sup>20</sup> Table F-14 lists municipalities in Massachusetts identified in the TMDLs as containing MS4s contributing metals to the impaired waterbody segments in Rhode Island, the impaired receiving water, the approved TMDL name, and the pollutant of concern. Any permittee (traditional or non-traditional) that operates an MS4 in a municipality listed in Table F-14 and the discharge is to a waterbody or tributary of a waterbody listed on Table F-14 is subject to the requirements of this part.

- 1) Traditional and non-traditional MS4s operating in the municipalities identified in Table F-14 and that discharge to a waterbody or a tributary of a waterbody identified on Table F-14 shall identify and implement BMPs designed to reduce metals discharges from its MS4. To address metals discharges, each permittee shall comply with the following BMPs in addition to the requirements of part 2.3 of the Permit, as described below:
  - a. Enhanced BMPs
    - i. The permittee remains subject to the requirements of part 2.3. of the permit and shall include the following enhancements to the BMPs required by part 2.3 of the permit:
      1. part 2.3.6, Stormwater Management in New Development and Redevelopment: stormwater management systems designed on commercial and industrial land use area draining to the water quality limited waterbody shall incorporate designs that allow for shutdown and containment where appropriate to isolate the system in the event of an emergency spill or other unexpected event. EPA also encourages the permittee to require any stormwater management system designed to infiltrate stormwater on commercial or industrial sites to provide the level of pollutant removal equal to or greater than the level of pollutant removal provided through the use of biofiltration of the same volume of runoff to be infiltrated, prior to infiltration.
      2. part 2.3.7, Good House Keeping and Pollution Prevention for Permittee Owned Operations: increased street sweeping frequency of all municipal owned streets and parking lots to a schedule determined by the permittee to target areas with potential for high pollutant loads. This may include, but is not limited to, increased street sweeping frequency in commercial areas and high density residential areas, or

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<sup>20</sup> See <http://www.dem.ri.gov/programs/benviron/water/quality/rest/reports.htm> for all RI TMDL documents. (retrieved 6/30/2014)

drainage areas with a large amount of impervious area. Prioritize inspection and maintenance for catch basins to ensure that no sump shall be more than 50 percent full. Clean catch basins more frequently if inspection and maintenance activities indicate excessive sediment or debris loadings. Each annual report shall include the street sweeping schedule determined by the permittee to target high pollutant loads.

<b>Municipality</b>	<b>Receiving Water</b>	<b>TMDL Name</b>
Attleboro	Upper Ten Mile River, Lower Ten Mile River, Central Pond, Turner Reservoir, Omega Pond	Total Maximum Daily Load Analysis For The Ten Mile River Watershed
North Attleborough	Upper Ten Mile River, Lower Ten Mile River, Central Pond, Turner Reservoir, Omega Pond	Total Maximum Daily Load Analysis For The Ten Mile River Watershed
Plainville	Upper Ten Mile River, Lower Ten Mile River, Central Pond, Turner Reservoir, Omega Pond	Total Maximum Daily Load Analysis For The Ten Mile River Watershed
Seekonk	Upper Ten Mile River, Lower Ten Mile River, Central Pond, Turner Reservoir, Omega Pond	Total Maximum Daily Load Analysis For The Ten Mile River Watershed

**Table F-14: Municipalities in Massachusetts identified in the TMDLs as containing MS4s contributing metals to the impaired waterbody segments in Rhode Island, the impaired receiving water, the approved TMDL name, and the pollutant of concern.**

2. At any time during the permit term the permittee may be relieved of additional requirements in Appendix F part B.IV.1. applicable to it when in compliance with this part.
  - a. The permittee is relieved of its additional requirements as of the date when one of the following criteria are met:
    - i. The applicable TMDL has been modified, revised or withdrawn and EPA has approved a new TMDL applicable for the receiving water that indicates that no additional stormwater controls for the control of metals (Cadmium, Lead, Aluminum, Iron) are necessary for the permittee’s discharge based on wasteload allocations in the newly approved TMDL

- b. In such a case, the permittee shall document the date of the approved TMDL in its SWMP and is relieved of any remaining requirements of Appendix F part B.IV.1 as of that date and the permittee shall comply with the following:
  - i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix F part B.IV.1 to date to reduce metals (Cadmium, Lead, Aluminum, Iron) in their discharges including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
  - ii. The permittee shall continue to implement all requirements of Appendix F part B.IV.1 required to be implemented prior to the date of the newly approved TMDL, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications.

**C. Requirements for Discharges to Impaired Waters with a Regional TMDL****I. The “Northeast Regional Mercury TMDL (2007)”**

The Northeast Regional Mercury TMDL does not specify a wasteload allocation or other requirements either individually or categorically for the MS4 discharges and specifies that load reductions are to be achieved through reduction in atmospheric deposition sources. No requirements related to this TMDL are imposed on MS4 discharges under this part. However, if the permittee becomes aware, or EPA or MassDEP determines, that an MS4 discharge is causing or contributing to such impairment to an extent that cannot be explained by atmospheric deposition (e.g. chemical spill, acid landfill leachate or other sources), the permittee shall comply with the requirements of part 2.1.1.d and 2.3.4 of the permit.

## **ATTACHMENT 1 TO APPENDIX F**

### **Method to Calculate Baseline Phosphorus Load (Baseline), Phosphorus Reduction Requirements and Phosphorus load increases due to development ( $P_{DEVinc}$ )**

The methods and annual phosphorus load export rates presented in Attachments 1, 2 and 3 are for the purpose of measuring load reductions for various stormwater BMPs treating runoff from different site conditions (i.e. impervious or pervious) and land uses (e.g. commercial, industrial, residential). The estimates of annual phosphorus load and load reductions due to BMPs are intended for use by the permittee to measure compliance with its Phosphorus Reduction Requirement under the permit.

This attachment provides the method to calculate a baseline phosphorus load discharging in stormwater for the impaired municipalities subject to Lakes and Ponds TMDL. A complete list of municipalities subject to these TMDLs is presented in Appendix F, Table F-6. This method shall be used to calculate the following annual phosphorus loads:

- 1) Baseline Phosphorus Load for Permittees
- 2) Phosphorus Reduction Requirement

This attachment also provides the method to calculate stormwater phosphorus load increases due to development for the municipalities subject to the Charles River TMDL requirements and the Lakes & Ponds TMDL requirements:

- 3) Phosphorus Load Increases due to Development

The **Baseline Phosphorus Load** is a measure of the annual phosphorus load discharging in stormwater from the impervious and pervious areas of the impaired Lake Phosphorus Control Plan (LPCP) Area.

The **Baseline Phosphorus Pounds Reduction** referred to as the permittee's **Phosphorus Reduction Requirement** represents the required reduction in annual phosphorus load in stormwater to meet the WLA for the impaired watershed. The percent phosphorus reduction for each watershed (identified in Appendix F, Table F-6) is applied to the Baseline Phosphorus Load to calculate the Phosphorus Pounds Reduction.

The **Phosphorus load increases due to development ( $P_{DEVinc}$ )** is the stormwater phosphorus load increases due to development over the previous reporting period and incurred to date. Increases in stormwater phosphorus load from development will increase the permittee's baseline phosphorus load and therefore, the phosphorus reduction requirement.

Examples are provided to illustrate use of the methods. Table 1-1 below provides annual composite phosphorus load export rates (PLERs) by land use category for the Baseline Load and Phosphorus Reduction Requirement calculations. The permittee shall select the land use category that most closely represents the actual use of the watershed. For watersheds with institutional type uses, such as government properties, hospitals, and schools, the permittee shall use the commercial land use category for the purpose of calculating phosphorus loads. Table 1-2 provides annual PLERs by land use category for impervious and pervious areas. The permittee shall select the land use category that most closely represents the actual use of the watershed. For pervious areas, if the hydrologic soil group (HSG) is known, use the appropriate value. If the HSG is not known, assume HSG C conditions for the phosphorus load export rate. For watersheds with

institutional type uses, such as government properties, hospitals, and schools, the permittee shall use the commercial/industrial land use category for the purpose of calculating phosphorus loads. Table 1-3 provides a crosswalk table of land use codes between Tables 1-1 and 1-2 and the codes used by MassGIS.

The composite PLERs in Table 1-1 to be used for calculating Baseline Phosphorus Load are based on the specified directly connected impervious area (DCIA). If the permittee determines through mapping and site investigations that the overall DCIA for the collective area for each land use category is different than the corresponding values in Table 1-1, then the permittee is encouraged to submit this information in its annual report and request EPA to recalculate the composite PLERs for the permittees to use in refining the Baseline Phosphorus Load calculation for the LPCP.

**(1) Baseline Phosphorus Load:** The permittee shall calculate the **Baseline Phosphorus Load** by the following procedure:

- 1) Determine the total area (acre) associated with the impaired watershed;
- 2) Sort the total area associated with the watershed into land use categories;
- 3) Calculate the annual phosphorus load associated with each land use category by multiplying the total area of land use by the appropriate land use-based composite phosphorus load export rate provided in Table 1-1; and
- 4) Determine the Baseline Phosphorus Load by summing the land use loads.

**Example 1-1 to determine Baseline Phosphorus Load:**

Watershed A is 18.0 acres, with 11.0 acres of industrial area (e.g. access drives, buildings, and parking lots), 3.0 acres of medium-density residential and 4.0 acres of unmanaged wooded area.

The **Baseline Phosphorus Load** = (Baseline P Load<sub>IND</sub>) + (Baseline P Load<sub>MDR</sub>) + (Baseline P Load<sub>FOR</sub>)

**Where:**

$$\begin{aligned} \text{Baseline P Load}_{\text{IND}} &= (\text{TA}_{\text{IND}}) \times (\text{PLER for industrial use (Table 1-1)}) \\ &= 11.0 \text{ acre} \times 1.27 \text{ lbs/acre/year} \\ &= 14.0 \text{ lbs P/year} \end{aligned}$$

$$\begin{aligned} \text{Baseline P Load}_{\text{MDR}} &= (\text{TA}_{\text{MDR}}) \times (\text{PLER for medium density residential (Table 1-1)}) \\ &= 3.0 \text{ acre} \times 0.49 \text{ lbs/acre/year} \\ &= 1.5 \text{ lbs P/year} \end{aligned}$$

$$\begin{aligned} \text{Baseline P Load}_{\text{FOR}} &= (\text{TA}_{\text{FOR}}) \times (\text{PLER for forest (Table 1-1)}) \\ &= 4.0 \text{ acre} \times 0.12 \text{ lbs/acre/year} \\ &= 0.5 \text{ lbs P/year} \end{aligned}$$

$$\begin{aligned} \text{Baseline Phosphorus Load} &= 14.0 \text{ lbs P/year} + 1.5 \text{ lbs P/year} + 0.5 \text{ lbs P/year} \\ &= \mathbf{16.0 \text{ lbs P/year}} \end{aligned}$$

**(2) Baseline Phosphorus Pounds Reduction (Phosphorus Reduction Requirement):** The Baselines Phosphorus Reduction requirement is the amount of reduction in annual phosphorus load (in pounds) that the permittee is required to achieve in the Watershed. The permittee shall calculate the **Phosphorus Reduction Requirement** by multiplying the **Baseline Phosphorus Load** by the applicable percent phosphorus reduction for that watershed specified in Table F-6 (Appendix F).

**Example 1-2 to determine Watershed Phosphorus Reduction Requirement:**  
 Table F-6 identifies Watershed A’s percent phosphorus reduction as 45%; therefore the Watershed Phosphorus Reduction Requirement is:

Phosphorus Reduction Requirement = (Baseline Phosphorus Load) x (0.45)  
 = (16.0 lbs P/year) x (0.45)  
 = **7.2 lbs P/year**

**(3) Phosphorus load increases due to development (P<sub>DEVinc</sub>):** To estimate the increases in stormwater phosphorus load due to development in the Watershed (either PCP or LPCP Area), the permittee will use the following procedure:

- 1) Determine the total area of development by land use category and calculate the baseline load from that area using the composite PLERs in Table 1-1;
- 2) Distribute the total development area into impervious and pervious subareas by land use category;
- 3) Calculate the phosphorus load due to development (P<sub>DEV</sub>) for each land use-based impervious and pervious subarea by multiplying the subarea by the appropriate phosphorus load export rate provided in Table 1-2; and
- 4) Determine the phosphorus load increase (P<sub>DEVinc</sub>) by subtracting the baseline phosphorus load from the increased phosphorus load due to development.

Note: If structural BMPs are installed as part of new development, the P<sub>DEVinc</sub> will be reduced by the amount of BMP load treated by that BMP as calculated in Attachment 3.

**Example 1-3 to determine Phosphorus Load Increases:** For the same 15.11 acre Watershed A as specified in Example 1-1, a permittee has tracked development in the LPCP Area in the last year that resulted in 1.5 acres of medium density residential area and 0.5 acres of forest land being converted to high density residential impervious area as detailed below. The undeveloped MDR area is pervious area, HSG C soil and the undeveloped forest area is pervious, HSG B soil.

Land Use Category	Baseline Area (acres)	P export rate (lbs P/acre/yr)*	Baseline area unchanged (acres)	P export rate (lbs P/acre/yr)**	Developed Area converted to HDR IA (acres)	P export rate (lbs P/acre/yr)**
Industrial	11.0	1.27	No change	--	No change	--
MDR	3.0	0.49	1.5	0.21	1.5	2.32

Forest	4.0	0.12	3.5	0.12	0.5	2.32
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\*From Table 1-1; \*\* From Table 1-2

The phosphorus load increase is calculated as:

$$\begin{aligned} \text{Baseline Load} &= (\text{Baseline P Load}_{\text{IND}}) + \\ &\quad (\text{Baseline P Load}_{\text{MDR}}) + \\ &\quad (\text{Baseline P Load}_{\text{FOR}}) \\ &= \mathbf{16.0 \text{ lb/year}} \text{ (determined in Example 1-1)} \end{aligned}$$

$$\begin{aligned} P_{\text{DEV}} &= (T_{\text{AIND}} \times \text{PLER}_{\text{IND}}) + (I_{\text{AHDR}} \times \text{PLER}_{\text{HDR}}) + (P_{\text{AMDR}} \times \text{PLER}_{\text{MDR}}) + (P_{\text{AFOR}} \times \\ &\quad \text{PLER}_{\text{FOR}}) \\ &= (11.0 \text{ acres} \times 1.27) + (2.0 \text{ acres} \times 2.32) + (1.5 \text{ acres} \times 0.21) + (3.5 \times \\ &\quad 0.12) \\ &= \mathbf{19.0 \text{ lbs P/year}} \end{aligned}$$

$$\begin{aligned} P_{\text{DEVinc}} &= P_{\text{DEV}} - \text{Baseline Load} \\ &= 19.0 - 16.0 \\ &= \mathbf{3.0 \text{ lbs/year}} \end{aligned}$$

**Table 1-1. Annual composite phosphorus load export rates**

Land Cover	Representative DCIA, %	Composite PLERs, lb/ac/yr	Composite PLERs, kg/ha/yr
Commercial	57	1.13	1.27
Industrial	67	1.27	1.42
High Density Residential	36	1.04	1.16
Medium Density Residential	16	0.49	0.55
Low Density Residential	11	0.30	0.34
Freeway	44	0.73	0.82
Open Space	8	0.26	0.29
Agriculture	0.4	0.45	0.50
Forest	0.1	0.12	0.13

**Table 1-2: Proposed average annual distinct P Load export rates for use in estimating P Load reduction credits the MA MS4 Permit**

Phosphorus Source Category by Land Use	Land Surface Cover	P Load Export Rate, lbs/acre/year	P Load Export Rate, kg/ha/yr
Commercial (Com) and Industrial (Ind)	Directly connected impervious	1.78	2.0
	Pervious	See* DevPERV	See* DevPERV
Multi-Family (MFR) and High-Density Residential (HDR)	Directly connected impervious	2.32	2.6
	Pervious	See* DevPERV	See* DevPERV
Medium -Density Residential (MDR)	Directly connected impervious	1.96	2.2
	Pervious	See* DevPERV	See* DevPERV
Low Density Residential (LDR) - "Rural"	Directly connected impervious	1.52	1.7
	Pervious	See* DevPERV	See* DevPERV
Highway (HWY)	Directly connected impervious	1.34	1.5
	Pervious	See* DevPERV	See* DevPERV
Forest (For)	Directly connected impervious	1.52	1.7
	Pervious	0.13	0.13
Open Land (Open)	Directly connected impervious	1.52	1.7
	Pervious	See* DevPERV	See* DevPERV
Agriculture (Ag)	Directly connected impervious	1.52	1.7
	Pervious	0.45	0.5
*Developed Land Pervious (DevPERV)- Hydrologic Soil Group A	Pervious	0.03	0.03
*Developed Land Pervious (DevPERV)- Hydrologic Soil Group B	Pervious	0.12	0.13
*Developed Land Pervious (DevPERV) - Hydrologic Soil Group C	Pervious	0.21	0.24
*Developed Land Pervious (DevPERV) - Hydrologic Soil Group C/D	Pervious	0.29	0.33
*Developed Land Pervious (DevPERV) - Hydrologic Soil Group D	Pervious	0.37	0.41

**Table 1-3: Crosswalk of MassGIS land-use categories to land-use groups for P Load Calculations**

<b>Mass GIS Land Use LU_CODE</b>	<b>Description</b>	<b>Land Use group for calculating P Load - 2013/14 MA MS4</b>
1	Crop Land	Agriculture
2	Pasture (active)	Agriculture
3	Forest	Forest
4	Wetland	Forest
5	Mining	Industrial
6	Open Land includes inactive pasture	open land
7	Participation Recreation	open land
8	spectator recreation	open land
9	Water Based Recreation	open land
10	Multi-Family Residential	High Density Residential
11	High Density Residential	High Density Residential
12	Medium Density Residential	Medium Density Residential
13	Low Density Residential	Low Density Residential
14	Saltwater Wetland	Water
15	Commercial	Commercial
16	Industrial	Industrial
17	Urban Open	open land
18	Transportation	Highway
19	Waste Disposal	Industrial
20	Water	Water
23	cranberry bog	Agriculture
24	Powerline	open land
25	Saltwater Sandy Beach	open land
26	Golf Course	Agriculture
29	Marina	Commercial
31	Urban Public	Commercial
34	Cemetery	open land
35	Orchard	Forest
36	Nursery	Agriculture
37	Forested Wetland	Forest
38	Very Low Density residential	Low Density Residential
39	Junkyards	Industrial
40	Brush land/Successional	Forest

## **ATTACHMENT 2 TO APPENDIX F**

### **Phosphorus Reduction Credits for Selected Enhanced Non-Structural BMPs**

The permittee shall use the following methods to calculate phosphorus load reduction credits for the following enhanced non-structural control practices implemented in the Watershed:

- 1) Enhanced Sweeping Program;
- 2) Catch Basin Cleaning;  
and
- 3) Organic Waste and Leaf Litter Collection program

The methods include the use of default phosphorus reduction factors that EPA has determined are acceptable for calculating phosphorus load reduction credits for these practices.

The methods and annual phosphorus load export rates presented in this attachment are for the purpose of counting load reductions for various BMPs treating storm water runoff from varying site conditions (i.e., impervious or pervious surfaces) and different land uses (e.g. industrial and commercial) within the impaired watershed. Table 2-1 below provides annual phosphorus load export rates by land use category for impervious and pervious areas. The estimates of annual phosphorus load and load reductions resulting from BMP implementation are intended for use by the permittee to measure compliance with its Phosphorus Reduction Requirement under the permit.

Examples are provided to illustrate use of the methods. In calculating phosphorus export rates, the permittee shall select the land use category that most closely represents the actual use for the area in question. For watersheds with institutional type uses, such as government properties, hospitals, and schools, the permittee shall use the commercial land use category for the purpose of calculating phosphorus loads. Table 2-2 provides a crosswalk table of land use codes between land use groups in Table 2-1 and the codes used by Mass GIS. For pervious areas, permittees should use the appropriate value for the hydrologic soil group (HSG) if known, otherwise, assume HSG C conditions.

**Alternative Methods and/or Phosphorus Reduction Factors:** A permittee may propose alternative methods and/or phosphorus reduction factors for calculating phosphorus load reduction credits for these non-structural practices. EPA will consider alternative methods and/or phosphorus reduction factors, provided that the permittee submits adequate supporting documentation to EPA. At a minimum, supporting documentation shall consist of a description of the proposed method, the technical basis of the method, identification of alternative phosphorus reduction factors, supporting calculations, and identification of references and sources of information that support the use of the alternative method and/or factors in the Watershed. If EPA determines that the alternative methods and/or factors are not adequately supported, EPA will notify the permittee and the permittee may receive no phosphorus reduction credit other than a reduction credit calculated by the permittee following the methods in this attachment for the identified practices.

**Table 2-1: Proposed average annual distinct P Load export rates for use in estimating P Load reduction credits in the MA MS4 Permit**

Phosphorus Source Category by Land Use	Land Surface Cover	P Load Export Rate, lbs/acre/year	P Load Export Rate, kg/ha/yr
Commercial (Com) and Industrial (Ind)	Directly connected impervious	1.78	2.0
	Pervious	See* DevPERV	See* DevPERV
Multi-Family (MFR) and High-Density Residential (HDR)	Directly connected impervious	2.32	2.6
	Pervious	See* DevPERV	See* DevPERV
Medium -Density Residential (MDR)	Directly connected impervious	1.96	2.2
	Pervious	See* DevPERV	See* DevPERV
Low Density Residential (LDR) - "Rural"	Directly connected impervious	1.52	1.7
	Pervious	See* DevPERV	See* DevPERV
Highway (HWY)	Directly connected impervious	1.34	1.5
	Pervious	See* DevPERV	See* DevPERV
Forest (For)	Directly connected impervious	1.52	1.7
	Pervious	0.13	0.13
Open Land (Open)	Directly connected impervious	1.52	1.7
	Pervious	See* DevPERV	See* DevPERV
Agriculture (Ag)	Directly connected impervious	1.52	1.7
	Pervious	0.45	0.5
*Developed Land Pervious (DevPERV) – HSG A	Pervious	0.03	0.03
*Developed Land Pervious (DevPERV) – HSG B	Pervious	0.12	0.13
*Developed Land Pervious (DevPERV) – HSG C	Pervious	0.21	0.24
*Developed Land Pervious (DevPERV) – HSG C/D	Pervious	0.29	0.33
*Developed Land Pervious (DevPERV) – HSG D	Pervious	0.37	0.41
Notes:			
<ul style="list-style-type: none"> <li>For pervious areas, if the hydrologic soil group (HSG) is known, use the appropriate value from this table. If the HSG is not known, assume HSG C conditions for the phosphorus load export rate.</li> <li>Agriculture includes row crops. Actively managed hay fields and pasture lands. Institutional land uses such as government properties, hospitals and schools are to be included in the commercial and industrial land use grouping for the purpose of calculating phosphorus loading.</li> <li>Impervious surfaces within the forest land use category are typically roadways adjacent to forested pervious areas.</li> </ul>			

**Table 2-2: Crosswalk of Mass GIS land use categories  
to land use groups for P load calculations**

Mass GIS Land Use LU_CODE	Description	Land Use group for calculating P Load - 2013/14 MA MS4
1	Crop Land	Agriculture
2	Pasture (active)	Agriculture
3	Forest	Forest
4	Wetland	Forest
5	Mining	Industrial
6	Open Land includes inactive pasture	open land
7	Participation Recreation	open land
8	spectator recreation	open land
9	Water Based Recreation	open land
10	Multi-Family Residential	High Density Residential
11	High Density Residential	High Density Residential
12	Medium Density Residential	Medium Density Residential
13	Low Density Residential	Low Density Residential
14	Saltwater Wetland	Water
15	Commercial	Commercial
16	Industrial	Industrial
17	Urban Open	open land
18	Transportation	Highway
19	Waste Disposal	Industrial
20	Water	Water
23	cranberry bog	Agriculture
24	Powerline	open land
25	Saltwater Sandy Beach	open land
26	Golf Course	Agriculture
29	Marina	Commercial
31	Urban Public	Commercial
34	Cemetery	open land
35	Orchard	Forest
36	Nursery	Agriculture
37	Forested Wetland	Forest
38	Very Low Density residential	Low Density Residential
39	Junkyards	Industrial
40	Brush land/Successional	Forest

**(1) Enhanced Sweeping Program:** The permittee may earn a phosphorus reduction credit for conducting an enhanced sweeping program of impervious surfaces. Table 2-2 below outlines the default phosphorus removal factors for enhanced sweeping programs. The credit shall be calculated by using the following equation:

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

**Where:**

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

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

**Table 2-3: Phosphorus reduction efficiency factors (PRF<sub>sweeping</sub>) for sweeping impervious areas**

Frequency <sup>1</sup>	Sweeper Technology	PRF <sub>sweeping</sub>
2/year (spring and fall) <sup>2</sup>	Mechanical Broom	0.01
2/year (spring and fall) <sup>2</sup>	Vacuum Assisted	0.02
2/year (spring and fall) <sup>2</sup>	High-Efficiency Regenerative Air-Vacuum	0.02
Monthly	Mechanical Broom	0.03
Monthly	Vacuum Assisted	0.04
Monthly	High Efficiency Regenerative Air-Vacuum	0.08
Weekly	Mechanical Broom	0.05
Weekly	Vacuum Assisted	0.08
Weekly	High Efficiency Regenerative Air-Vacuum	0.10

<sup>1</sup>For full credit for monthly and weekly frequency, sweeping must be conducted year round. Otherwise, the credit should be adjusted proportionally based on the duration of the sweeping season (using AF factor).

<sup>2</sup> In order to earn credit for semi-annual sweeping the sweeping must occur in the spring following snow-melt and road sand applications to impervious surfaces and in the fall after leaf-fall and prior to the onset to the snow season.

**Example 2-1: Calculation of enhanced sweeping program credit (Credit<sub>sweeping</sub>):** A permittee proposes to implement an enhanced sweeping program and perform weekly sweeping from March 1 – December 1 (9 months) in their Watershed, using a vacuum assisted sweeper on 20.3 acres of parking lots and roadways in a high-density residential area of the Watershed. For this site the needed information is:

- IA<sub>swept</sub> = 20.3 acres
- PLE<sub>IC-HDR</sub> = 2.32 lb/acre/yr (from Table 2-1)
- PRF<sub>sweeping</sub> = 0.08 (from Table 2-3)
- AF = (9 months / 12 months) = 0.75

Substitution into equation 2-1 yields a Credit<sub>sweeping</sub> of 3.2 pounds of phosphorus removed per year.

$$\begin{aligned} \text{Credit}_{\text{sweeping}} &= \text{IA}_{\text{swept}} \times \text{PLE}_{\text{land use}} \times \text{PRF}_{\text{sweeping}} \times \text{AF} \\ &= 20.3 \text{ acres} \times 2.32 \text{ lbs/acre/yr} \times 0.08 \times 0.75 \\ &= \mathbf{2.8 \text{ lbs/yr}} \end{aligned}$$

**(2) Catch Basin Cleaning:** The permittee may earn a phosphorus reduction credit, Credit<sub>CB</sub>, by removing accumulated materials from catch basins (i.e., catch basin cleaning) in the Watershed such that a minimum sump storage capacity of 50% is maintained throughout the year. The credit shall be calculated by using the following equation:

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

**Where:**

- Credit<sub>CB</sub> = Amount of phosphorus load removed by catch basin cleaning (lb/year)
- IA<sub>CB</sub> = Impervious drainage area to catch basins (acres)
- PLE<sub>IC-and use</sub> = Phosphorus Load Export Rate for impervious cover and specified land use (lb/acre/yr) (see Table 2-1)
- PRF<sub>CB</sub> = Phosphorus Reduction Factor for catch basin cleaning (see Table 2-4)

**Table 2-4: Phosphorus reduction efficiency factor (PRF<sub>CB</sub>) for semi-annual catch basin cleaning**

Frequency	Practice	PRF <sub>CB</sub>
Semi-annual	Catch Basin Cleaning	0.02

**Example 2-2: Calculation for catch basin cleaning credit (Credit<sub>CB</sub>):**

A permittee proposes to clean catch basins in their Watershed (i.e., remove accumulated sediments and contaminants captured in the catch basins) that drain runoff from 15.3 acres of medium-density residential impervious area. For this site the needed information is:

IA <sub>CB</sub>	= 15.3 acre
PLE <sub>IC-MDR</sub>	= 1.96 lbs/acre/yr (from Table 2-1)
PRF <sub>CB</sub>	= 0.02 (from Table 2-4)

Substitution into equation 2-2 yields a Credit<sub>CB</sub> of 0.6 pounds of phosphorus removed per year:

$$\begin{aligned} \text{Credit}_{CB} &= \text{IA}_{CB} \times \text{PLE}_{IC-MDR} \times \text{PRF}_{CB} \\ &= 15.3 \text{ acre} \times 1.96 \text{ lbs/acre/yr} \times 0.02 \\ &= \mathbf{0.6 \text{ lbs/yr}} \end{aligned}$$

**(3) Enhanced Organic Waste and Leaf Litter Collection program:** The permittee may earn a phosphorus reduction credit by performing regular gathering, removal and disposal of landscaping wastes, organic debris, and leaf litter from impervious surfaces from which runoff discharges to the TMDL waterbody or its tributaries. In order to earn this credit (Credit<sub>leaf litter</sub>), the permittee 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. Credit can only be earned for those impervious surfaces that are cleared of organic materials in accordance with the description above. The gathering and removal shall occur immediately following any landscaping activities in the Watershed and at additional times when necessary to achieve a weekly cleaning frequency. The permittee must ensure that the disposal of these materials will not contribute pollutants to any surface water discharges. The permittee may use an enhanced sweeping program (e.g., weekly frequency) as part of earning this credit provided that the sweeping is effective at removing leaf litter and organic materials. The Credit<sub>leaf litter</sub> shall be determined by the following equation:

$$\text{Credit}_{\text{leaf litter}} = (\text{Watershed Area}) \times (\text{PLE}_{IC\text{-land use}}) \times (0.05) \quad \text{(Equation 2-3)}$$

**Where:**

Credit <sub>leaf litter</sub>	= Amount of phosphorus load reduction credit for organic waste and leaf litter collection program (lb/year)
Watershed Area	= All impervious area (acre) from which runoff discharges to the TMDL waterbody or its tributaries in the Watershed
PLE <sub>IC-land use</sub>	= Phosphorus Load Export Rate for impervious cover and specified land use (lbs/acre/yr) (see Table 2-1)
0.05	= 5% phosphorus reduction factor for organic waste and leaf litter collection program in the Watershed

**Example 2-3: Calculation for organic waste and leaf litter collection program credit**

**(Credit<sub>leaf litter</sub>):** A permittee proposes to implement an organic waste and leaf litter collection program by sweeping the parking lots and access drives at a minimum of once per week using a mechanical broom sweeper for the period of September 1 to December 1 over 12.5 acres of impervious roadways and parking lots in an industrial/commercial area of the Watershed. Also, the permittee will ensure that organic materials are removed from impervious areas immediately following all landscaping activities at the site. For this site the needed information to calculate the Credit<sub>leaf litter</sub> is:

$$\begin{aligned} \text{Watershed Area} &= 12.5 \text{ acres; and} \\ \text{PLE}_{\text{IC-commercial}} &= 1.78 \text{ lbs/acre/yr (from Table 2-1)} \end{aligned}$$

Substitution into equation 2-4 yields a Credit<sub>leaf litter</sub> of 1.1 pounds of phosphorus removed per year:

$$\begin{aligned} \text{Credit}_{\text{leaf litter}} &= (12.5 \text{ acre}) \times (1.78 \text{ lbs/acre/yr}) \times (0.05) \\ &= 1.1 \text{ lbs/yr} \end{aligned}$$

The permittee also may earn a phosphorus reduction credit for enhanced sweeping of roads and parking lot areas (i.e., Credit<sub>sweeping</sub>) for the three months of use. Using equation 2-1, Credit<sub>sweeping</sub> is:

$$\begin{aligned} \text{Credit}_{\text{sweeping}} &= \text{IA}_{\text{swept}} \times \text{PLE}_{\text{IC-land use}} \times \text{PRF}_{\text{sweeping}} \times \text{AF} && \text{(Equation 2-1)} \\ \text{IA}_{\text{swept}} &= 12.5 \text{ acre} \\ \text{PLE}_{\text{IC-commercial}} &= 1.78 \text{ lbs/acre/yr (from Table 2-1)} \\ \text{PRF}_{\text{sweeping}} &= 0.05 \text{ (from Table 2-3)} \\ \text{AF} &= 3 \text{ mo./12 mo.} = 0.25 \end{aligned}$$

Substitution into equation 2-1 yields a Credit<sub>sweeping</sub> of 0.28 pounds of phosphorus removed per year.

$$\begin{aligned} \text{Credit}_{\text{sweeping}} &= \text{IA}_{\text{swept}} \times \text{PLE}_{\text{IC-commercial}} \times \text{PRF}_{\text{sweeping}} \times \text{AF} \\ &= 12.5 \text{ acre} \times 1.78 \text{ lbs/acre/yr} \times 0.05 \times 0.25 \\ &= \mathbf{0.3 \text{ lbs/yr}} \end{aligned}$$

## **ATTACHMENT 3 TO APPENDIX F**

### **Methods to Calculate Phosphorus Load Reductions for Structural Stormwater Best Management Practices**

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**Methods to Calculate Phosphorus Load Reductions for Structural Stormwater Best Management Practices in the Watershed**

This attachment provides methods to determine design storage volume capacities and to calculate phosphorus load reductions for the following structural Best Management Practices (structural BMPs) for a Watershed:

- 1) Infiltration Trench;
- 2) Infiltration Basin or other surface infiltration practice;
- 3) Bio-filtration Practice;
- 4) Gravel Wetland System;
- 5) Porous Pavement;
- 6) Wet Pond or wet detention basin;
- 7) Dry Pond or detention basin; and
- 8) Dry Water Quality Swale/ Grass Swale.

Additionally, this attachment provides methods to design and quantify associated phosphorus load reduction credits for the following four types of semi-structural/non-structural BMPs

- 9) Impervious Area Disconnection through Storage (e.g., rain barrels, cisterns, etc);
- 10) Impervious Area Disconnection;
- 11) Conversions of Impervious Area to Permeable Pervious Area; and
- 12) Soil Amendments to Enhance Permeability of Pervious Areas.

Methods and examples are provided in this Attachment to calculate phosphorus load reductions for structural BMPs for the four following purposes:

- 1) To determine the design volume of a structural BMP to achieve a known phosphorus load reduction target when the contributing drainage area is 100% impervious;
- 2) To determine the phosphorus load reduction for a structural BMP with a known design volume when the contributing drainage area is 100% impervious;
- 3) To determine the design volume of a structural BMP to achieve a known phosphorus load reduction target when the contributing drainage area has impervious and pervious surfaces; and
- 4) To determine the phosphorus load reduction for a structural BMP with a known design volume when the contributing drainage area has impervious and pervious surfaces.

Examples are also provided for estimating phosphorus load reductions associated with the four semi-structural/non-structural BMPs.

Also, this attachment provides the methodology for calculating the annual stormwater phosphorus load that will be delivered to BMPs for treatment (BMP Load) and to be used for quantifying phosphorus load reduction credits. The methods and annual phosphorus export load rates presented in this attachment are for the purpose of counting load reductions for various BMPs treating storm water runoff from varying site conditions (i.e., impervious or pervious surfaces) and different land uses (e.g. commercial and industrial). The estimates of annual phosphorus load and load reductions by BMPs are to demonstrate compliance with the permittee's Phosphorus Reduction Requirement under the permit.

## Appendix F Attachment 3

**Structural BMP performance credits:** For each structural BMP type identified above (BMPs 1-8), long-term cumulative performance information is provided to calculate phosphorus load reductions or to determine needed design storage volumes to achieve a specified reduction target (e.g., 65% phosphorus load reduction). The performance information is expressed as cumulative phosphorus load removed (% removed) depending on the physical storage capacity of the structural BMP (expressed as inches of runoff from impervious area) and is provided at the end of this Attachment (see Tables 3-1 through 3-18 and performance curves Figures 3-1 through 3-17). Multiple tables and performance curves are provided for the infiltration practices to represent cumulative phosphorus load reduction performance for six infiltration rates (IR), 0.17, 0.27, 0.53, 1.02, 2.41, and 8.27 inches/hour. These infiltration rates represent the saturated hydraulic conductivity of the soils. The permittee may use the performance curves provided in this attachment to interpolate phosphorus load removal reductions for field measured infiltration rates that are different than the infiltration rates used to develop the performance curves. Otherwise, the permittee shall use the performance curve for the IR that is nearest, but less than, the field measured rate. Physical storage capacity equals the total physical storage volume of the control structure to contain water at any instant in time. Typically, this storage capacity is comprised of the surface ponding storage volume prior to overflow and subsurface storage volumes in storage units and pore spaces of coarse filter media. Table 3-30 provides the formulae to calculate physical storage capacities for the structural control types for using the performance curves.

**Semi-Structural/Non-structural BMP performance credits:** For each semi-structural/non-structural BMP type identified above (BMPs 9-12), long-term cumulative performance information is provided to calculate phosphorus load reductions or to determine needed design specifications to achieve a desired reduction target (e.g., 50% phosphorus load reduction). The performance information is expressed as cumulative runoff volume reduction (% removed) depending on the design specifics and actual field conditions. Cumulative percent runoff volume reduction is being used to estimate the cumulative phosphorus load reduction credit for these BMPs. To represent a wide range of potential conditions for implementing these types of BMPs, numerous performance tables and curves have been developed to reflect a wide range of potential conditions and designs such as varying storage volumes (expressed in terms of varying ratios of storage volume to impervious area (0.1 to 2.0 inches)); varying ratios of impervious source area to receiving pervious area based on hydrologic soil groups (HSGs) A, B, C and D (8:1, 6:1, 4:1, 2: 1 and 1:1); and varying discharge time periods for temporary storage (1, 2 or 3 days) . The default credits are provided at the end of this Attachment (see Tables 3-19 through 3-26 and performance curves Figures 3-18 through 3-38).

EPA will consider phosphorus load reductions calculated using the methods provided below to be valid for the purpose of complying with the terms of this permit for BMPs that have not been explicitly modeled if the desired BMP has functionality that is similar to one of the simulated BMP types. Please note that only the surface infiltration and the infiltration trench BMP types were simulated to direct storm water runoff into the ground (i.e., infiltration). All of the other simulated BMPs represent practices that have either under-drains or impermeable liners and therefore, are not hydraulically connected to the sub-surface soils (i.e., no infiltration). Following are some simple guidelines for selecting the BMP type and/or determining whether the results of any of the BMP types provided are appropriate for another BMP of interest.

**Infiltration Trench** is a practice that provides temporary storage of runoff using the void spaces within the soil/sand/gravel mixture that is used to backfill the trench for subsequent infiltration into the surrounding sub-soils. Performance results for the infiltration trench can be used for all subsurface infiltration practices including systems that include pipes and/or chambers that provide temporary storage. Also, the results for this BMP type can be used for bio-retention systems that rely on infiltration when the majority of the temporary storage capacity is provided in the void spaces of the soil filter media and porous pavements that allow infiltration to occur.

**Surface Infiltration** represents a practice that provides temporary surface storage of runoff (e.g., ponding) for subsequent infiltration into the ground. Appropriate practices for use of the surface infiltration performance estimates include infiltration basins, infiltration swales, rain gardens and bio-retention systems that rely on infiltration and provide the majority of storage capacity through surface-ponding. If an infiltration system includes both surface storage through ponding and a lesser storage volume within the void spaces of a coarse filter media, then the physical storage volume capacity used to determine the long-term cumulative phosphorus removal efficiency from the infiltration basin performance curves would be equal to the sum of the surface storage volume and the void space storage volume. General design specifications for various surface infiltration systems are provided in the most recent version of *the Massachusetts Stormwater Handbook, Volume 2/Chapter2* (<http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/v2c2.pdf>).

**Bio-filtration** is a practice that provides temporary storage of runoff for filtering through an engineered soil media. The storage capacity is typically made of void spaces in the filter media and temporary ponding at the surface of the practice. Once the runoff has passed through the filter media it is collected by an under-drain pipe for discharge. The performance curve for this control practice assumes zero infiltration. If a filtration system has subsurface soils that are suitable for infiltration, then user should use the either performance curves for the infiltration trench or the infiltration basin depending on the predominance of storage volume made up by free standing storage or void space storage. Depending on the design of the filter media manufactured or packaged bio-filter systems such as tree box filters may be suitable for using the bio-filtration performance results. Design specifications for bio-filtration systems are provided in the most recent version of *the Massachusetts Stormwater Handbook, Volume 2/Chapter2* (<http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/v2c2.pdf>).

**Gravel Wetland** performance results should be used for practices that have been designed in accordance or share similar features with the design specifications for gravel wetland systems provided in the most recent version of *the Massachusetts Stormwater Handbook, Volume 2/Chapter2* (<http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/v2c2.pdf>).

**Porous Pavement** performance results represent systems with an impermeable under-liner and an under-drain. *If porous pavement systems do not have an impermeable under-liner so that filtered runoff can infiltrate into sub-soils then the performance results for an infiltration trench may be used for these systems.* Design specifications for porous pavement systems are provided in the most recent version of *the Massachusetts Stormwater Handbook, Volume 2/Chapter2* (<http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/v2c2.pdf>).

**Extended Dry Detention Pond** performance results should only be used for practices that have been designed in accordance with the design specifications for extended dry detention ponds provided in the most recent version of *the Massachusetts Stormwater Handbook, Volume 2/Chapter2* (<http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/v2c2.pdf>)

**Dry Water Quality Swale/ Grass Swale** performance results should only be used for practices that have been designed in accordance with the design specifications for a water quality dry swale provided in the most recent version of *the Massachusetts Stormwater Handbook, Volume 2/Chapter2* (<http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/v2c2.pdf>)

**Impervious Area Disconnection using Storage (e.g., rain barrels, cistern, etc)** performance results are for collecting runoff volumes from impervious areas such as roof tops, providing temporary storage of runoff volume using rain barrels, cisterns or other storage containers, and discharging stored volume to adjacent permeable pervious surfaces over an extended period of time.

**Impervious Area Disconnection** performance results are for diverting runoff volumes from impervious areas such as roadways, parking lots and roof tops, and discharging it to adjacent vegetated permeable surfaces that are of sufficient size with adequate soils to receive the runoff without causing negative impacts to adjacent down-gradient properties. Careful consideration must be given to the ratio of impervious area to the pervious area that will receive the discharge. Also, devices such as level spreaders to disperse the discharge and provide sheet flow should be employed whenever needed to increase recharge and avoid flow concentration and short circuiting through the pervious area. Soil testing is needed to classify the permeability of the receiving pervious area in terms of HSG.

**Conversion of Impervious Area to Permeable Pervious Area** phosphorus load reduction credits are for replacing existing impervious surfaces (such as traditional pavements and buildings with roof tops) with permeable surfaces. To be eligible for credit, it is essential that the area previously covered with impervious surface be restored to provide natural or enhanced hydrologic functioning so that the surface is permeable. Sub-soils beneath pavements are typically highly compacted and will require reworking to loosen the soil and the possible addition of soil amendments to restore permeability. Soil testing is needed to classify the permeability (in terms of HSG) of the restored pervious area.

**Soil Amendments to Increase Permeability of Pervious Areas** performance results are for the practice of improving the permeability of pervious areas through incorporation of soil amendments, tilling and establishing dense vegetation. This practice may be used to complement other practices such as impervious area disconnection to improve overall performance and increase reduction credits earned. Soil testing is needed to classify the permeability (in terms of HSG) of the restored pervious area.

**Alternative Methods:**

## Appendix F Attachment 3

A permittee may propose alternative long-term cumulative performance information or alternative methods to calculate phosphorus load reductions for the structural BMPs identified above or for other structural BMPs not identified in this Attachment.

EPA will consider alternative long-term cumulative performance information and alternative methods to calculate phosphorus load reductions for structural BMPs provided that the permittee provides EPA with adequate supporting documentation. At a minimum, the supporting documentation shall include:

- 1) Results of continuous BMP model simulations representing the structural BMP, using a verified BMP model and representative long-term (i.e., 10 years) climatic data including hourly rainfall data;
- 2) Supporting calculations and model documentation that justify use of the model, model input parameters, and the resulting cumulative phosphorus load reduction estimate;
- 3) If pollutant removal performance data are available for the specific BMP, model calibration results should be provided; and
- 4) Identification of references and sources of information that support the use of the alternative information and method.

If EPA determines that the long-term cumulative phosphorus load reductions developed based on alternative information are not adequately supported, EPA will notify the permittee in writing, and the permittee may receive no phosphorus reduction credit other than a reduction credit calculated by the permittee using the default phosphorus reduction factors provided in this attachment for the identified practices. The permittee is required to submit to EPA valid phosphorus load reductions for structural BMPs in the watershed in accordance with the submission schedule requirements specified in the permit and Appendix F.

### **Method to Calculate Annual Phosphorus Load Delivered to BMPs (BMP Load)**

The **BMP Load** is the annual phosphorus load from the drainage area to each proposed or existing BMP used by permittee to claim credit against its stormwater phosphorus load reduction requirement (i.e., Phosphorus Reduction Requirement). The BMP Load is the starting point from which the permittee calculates the reduction in phosphorus load achieved by each existing and proposed BMP.

Examples are provided to illustrate use of the methods. Table 3-1 below provides annual phosphorus load export rates (PLERs) by land use category for impervious and pervious areas. The permittee shall select the land use category that most closely represents the actual use of the watershed. For pervious areas, if the hydrologic soil group (HSG) is known, use the appropriate value. If the HSG is not known, assume HSG C conditions for the phosphorus load export rate. For watersheds with institutional type uses, such as government properties, hospitals, and schools, the permittee shall use the commercial/industrial land use category for the purpose of calculating phosphorus loads. Table 3-2 provides a crosswalk table of land use codes between land use groups in Table 3-1 and the codes used by MassGIS.

### Appendix F Attachment 3

**BMP Load:** To estimate the annual phosphorus load reduction that a storm water BMP can achieve, it is first necessary to estimate the amount of annual phosphorus load that the BMP will receive or treat (BMP Load).

For a given BMP:

- 1) Determine the total drainage area to the BMP;
- 2) Distribute the total drainage area into impervious and pervious subareas by land use category as defined by Tables 3-1 and 3-2;
- 3) Calculate the phosphorus load for each land use-based impervious and pervious subarea by multiplying the subarea by the appropriate phosphorus load export rate provided in Table 3-1; and
- 4) Determine the total annual phosphorus load to the BMP by summing the calculated impervious and pervious subarea phosphorus loads.

**Example 3-1 to determine phosphorus load to a proposed BMP:** A permittee is proposing a surface stormwater infiltration system that will treat runoff from an industrial site with an area of 12.87 acres (5.21 hectares) and is made up of 10.13 acres of impervious cover (e.g., roadways, parking areas and rooftops), 1.85 acres of landscaped pervious area and 0.89 acres of wooded area both with HSG C soils. The drainage area information for the proposed BMP is:

<b>BMP Subarea ID</b>	<b>Land Use Category</b>	<b>Cover Type</b>	<b>Area (acres)</b>	<b>P export rate (lb/acre/yr)*</b>
1	Industrial	impervious	10.13	1.78
2	Landscaped (HSG C)	pervious	1.85	0.21
3	Forest (HSG C)	pervious	0.89	0.12

\*From Table 3-1

The phosphorus load to the proposed BMP (BMP Load) is calculated as:

$$\begin{aligned}
 \text{BMP Load} &= (IA_{\text{Ind}} \times \text{PLER}_{\text{Ind}}) + (PA_{\text{Ind}} \times \text{PLER}_{\text{Ind}}) + (PA_{\text{FOREST}} \times \text{PLER}_{\text{For}}) \\
 &= (10.13 \times 1.78) + (1.85 \times 0.21) + (0.89 \times 0.12) \\
 &= \mathbf{18.53 \text{ lbs P/year}}
 \end{aligned}$$

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**Table 3-1: Average annual distinct phosphorus load (P Load) export rates for use in estimating phosphorus load reduction credits the MA MS4 Permit**

Phosphorus Source Category by Land Use	Land Surface Cover	P Load Export Rate, lbs/acre/year	P Load Export Rate, kg/ha/yr
Commercial (Com) and Industrial (Ind)	Directly connected impervious	1.78	2.0
	Pervious	See* DevPERV	See* DevPERV
Multi-Family (MFR) and High-Density Residential (HDR)	Directly connected impervious	2.32	2.6
	Pervious	See* DevPERV	See* DevPERV
Medium -Density Residential (MDR)	Directly connected impervious	1.96	2.2
	Pervious	See* DevPERV	See* DevPERV
Low Density Residential (LDR) - "Rural"	Directly connected impervious	1.52	1.7
	Pervious	See* DevPERV	See* DevPERV
Highway (HWY)	Directly connected impervious	1.34	1.5
	Pervious	See* DevPERV	See* DevPERV
Forest (For)	Directly connected impervious	1.52	1.7
	Pervious	0.13	0.13
Open Land (Open)	Directly connected impervious	1.52	1.7
	Pervious	See* DevPERV	See* DevPERV
Agriculture (Ag)	Directly connected impervious	1.52	1.7
	Pervious	0.45	0.5
*Developed Land Pervious (DevPERV)- Hydrologic Soil Group A	Pervious	0.03	0.03
*Developed Land Pervious (DevPERV)- Hydrologic Soil Group B	Pervious	0.12	0.13
*Developed Land Pervious (DevPERV) - Hydrologic Soil Group C	Pervious	0.21	0.24
*Developed Land Pervious (DevPERV) - Hydrologic Soil Group C/D	Pervious	0.29	0.33
*Developed Land Pervious (DevPERV) - Hydrologic Soil Group D	Pervious	0.37	0.41

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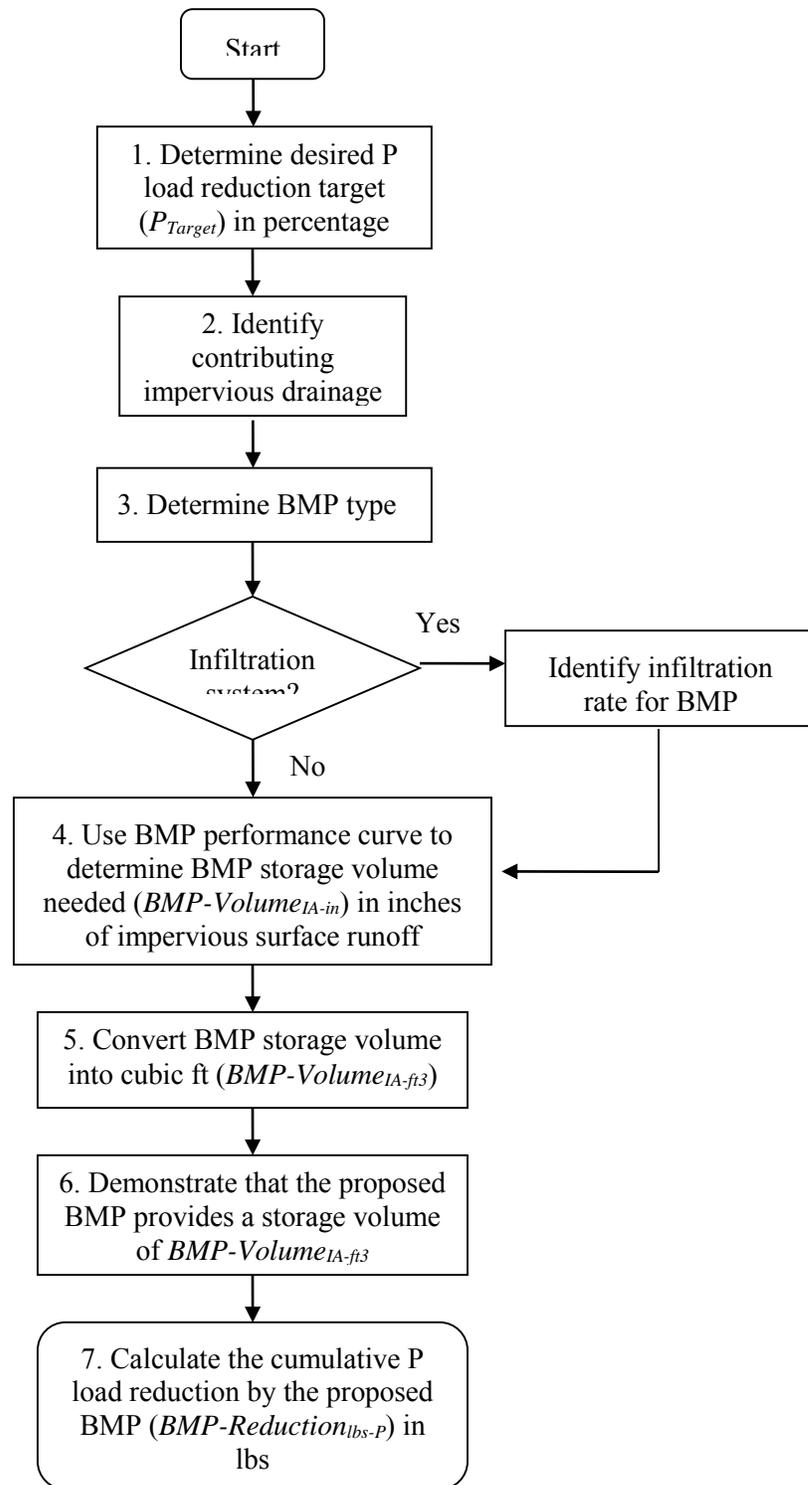
**Table 3- 2: MassGIS land-use categories with associated land-use groups for phosphorus load calculations**

Mass GIS Land Use LU_CODE	Description	Land Use group for calculating P Load - 2013/14 MA MS4
1	Crop Land	Agriculture
2	Pasture (active)	Agriculture
3	Forest	Forest
4	Wetland	Forest
5	Mining	Industrial
6	Open Land includes inactive pasture	open land
7	Participation Recreation	open land
8	spectator recreation	open land
9	Water Based Recreation	open land
10	Multi-Family Residential	High Density Residential
11	High Density Residential	High Density Residential
12	Medium Density Residential	Medium Density Residential
13	Low Density Residential	Low Density Residential
14	Saltwater Wetland	Water
15	Commercial	Commercial
16	Industrial	Industrial
17	Urban Open	open land
18	Transportation	Highway
19	Waste Disposal	Industrial
20	Water	Water
23	cranberry bog	Agriculture
24	Powerline	open land
25	Saltwater Sandy Beach	open land
26	Golf Course	Agriculture
29	Marina	Commercial
31	Urban Public	Commercial
34	Cemetery	open land
35	Orchard	Forest
36	Nursery	Agriculture
37	Forested Wetland	Forest
38	Very Low Density residential	Low Density Residential
39	Junkyards	Industrial
40	Brush land/Successional	Forest

**(1) Method to determine the design volume of a structural BMP to achieve a known phosphorus load reduction target when the contributing drainage area is 100% impervious:**

### Appendix F Attachment 3

Flow Chart 1 illustrates the steps to determine the design volume of a structural BMP to achieve a known phosphorus load reduction target when the contributing drainage area is 100% impervious.



**Flow Chart 1: Method to determine BMP design volume to achieve a known phosphorous load reduction when contributing drainage area is 100% impervious.**

- 1) Determine the desired cumulative phosphorus load reduction target ( $P_{\text{target}}$ ) in percentage for the structural BMP;
- 2) Determine the contributing impervious drainage area (IA) in acres to the structural BMP;
- 3) Determine the structural BMP type (e.g., infiltration trench, gravel wetland). For infiltration systems, determine the appropriate infiltration rate for the location of the BMP in the Watershed;
- 4) Using the cumulative phosphorus removal performance curve for the selected structural BMP (Figures 3-1 through 3-18), determine the storage volume for the BMP (BMP-Volume  $_{\text{IA-in}}$ ), in inches of runoff, needed to treat runoff from the contributing IA to achieve the reduction target;
- 5) Calculate the corresponding BMP storage volume in cubic feet (BMP-Volume  $_{\text{IA-ft}^3}$ ) using BMP-Volume  $_{\text{IA-in}}$  determined from step 4 and equation 3-1:

$$\text{BMP-Volume}_{\text{IA-ft}^3} = \text{IA (acre)} \times \text{BMP-Volume}_{\text{IA-in}} \times 3630 \text{ ft}^3/\text{ac-in} \quad \text{(Equation 3-1)}$$

- 6) Provide supporting calculations using the dimensions and specifications of the proposed structural BMP showing that the necessary storage volume, BMP-Volume  $_{\text{IA-ft}^3}$ , determined from step 5 will be provided to achieve the  $P_{\text{Target}}$ ; and
- 7) Calculate the cumulative phosphorus load reduction in pounds of phosphorus (BMP-Reduction  $_{\text{lbs-P}}$ ) for the structural BMP using the BMP Load (as calculated from the procedure in Attachment 1 to Appendix F) and  $P_{\text{target}}$  by using equation 3-2:

$$\text{BMP-Reduction}_{\text{lbs-P}} = \text{BMP Load} \times (P_{\text{target}} / 100) \quad \text{(Equation 3-2)}$$

**Example 3-2 to determine design volume of a structural BMP with a 100% impervious drainage area to achieve a known phosphorus load reduction target:**

A permittee is considering a surface infiltration practice to capture and treat runoff from 2.57 acres (1.04 ha) of commercial impervious area that will achieve a 70% reduction in annual phosphorus load. The infiltration practice would be located adjacent to the impervious area. The permittee has measured an infiltration rate (IR) of 0.39 inches per hour (in/hr) in the vicinity of the proposed infiltration practice. Determine the:

- A) Design storage volume needed for an surface infiltration practice to achieve a 70% reduction in annual phosphorus load from the contributing drainage area (BMP-Volume  $_{\text{IA-ft}^3}$ ); and
- B) Cumulative phosphorus reduction in pounds that would be accomplished by the BMP (BMP-Reduction  $_{\text{lbs-P}}$ )

**Solution:**

- 1) Contributing impervious drainages area (IA) = 2.57 acres

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BMP type is a surface infiltration practice (i.e., basin) with an infiltration rate (IR) of 0.39 in/hr

**Solution continued:**

3) Phosphorus load reduction target ( $P_{target}$ ) = 70%

4) The performance curve for the infiltration basin (i.e., surface infiltration practice), Figure 3-8, IR = 0.27 in/hr is used to determine the design storage volume of the BMP (BMP-Volume<sub>IA-in</sub>) needed to treat runoff from the contributing IA and achieve a  $P_{target}$  = 70%. The curve for an infiltration rate of 0.27 in/hr is chosen because 0.27 in/hr is the nearest simulated IR that is less than the field measured IR of 0.39 in/hr. From Figure 3-8, the BMP-Volume<sub>IA-in</sub> for a  $P_{target}$  = 70% is 0.36 in.

5) The BMP-Volume<sub>IA-in</sub> is converted to cubic feet (BMP-Volume<sub>IA-ft<sup>3</sup></sub>) using Equation 3-1:

$$\begin{aligned} \text{BMP-Volume}_{IA-ft^3} &= \text{IA (acre)} \times \text{BMP-Volume}_{IA-in} \times 3,630 \text{ ft}^3/\text{acre-in} \\ \text{BMP-Volume}_{IA-ft^3} &= 2.57 \text{ acre} \times 0.36 \text{ in} \times 3,630 \text{ ft}^3/\text{acre-in} \\ &= \mathbf{3,359 \text{ ft}^3} \end{aligned}$$

6) A narrow trapezoidal infiltration basin with the following characteristics is proposed to achieve the  $P_{Target}$  of 70%:

Length (ft)	Design Depth (ft)	Side Slopes	Bottom area (ft <sup>2</sup> )	Pond surface area (ft <sup>2</sup> )	Design Storage Volume (ft <sup>3</sup> )
355	1.25	3:1	1,387	4,059	3,404

The volume of the proposed infiltration practice, 3,404 ft<sup>3</sup>, exceeds the BMP-Volume<sub>IA-ft<sup>3</sup></sub> needed, 3,359 ft<sup>3</sup> and is sufficient to achieve the  $P_{Target}$  of 70%.

7) The cumulative phosphorus load reduction in pounds of phosphorus for the infiltration practice (BMP-Reduction<sub>lbs-P</sub>) is calculated using Equation 3-2. The BMP Load is first determined using the method described above.

$$\begin{aligned} \text{BMP Load} &= \text{IA} \times \text{impervious cover phosphorus export loading rate for commercial use (see Table 3-1)} \\ &= 2.57 \text{ acres} \times 1.78 \text{ lbs/acre/yr} \\ &= 4.58 \text{ lbs/yr} \end{aligned}$$

$$\begin{aligned} \text{BMP-Reduction}_{lbs-P} &= \text{BMP Load} \times (P_{target} / 100) \\ \text{BMP-Reduction}_{lbs-P} &= 4.58 \text{ lbs/yr} \times (70/100) \\ &= \mathbf{3.21 \text{ lbs/yr}} \end{aligned}$$

**Alternate Solution:** Alternatively, the permittee could determine the design storage volume needed for an IR = 0.39 in/hr by performing interpolation of the results from the surface

### Appendix F Attachment 3

infiltration performance curves for IR = 0.27 in/hr and IR = 0.52 in/hr as follows (replacing steps 3 and 4 on the previous page):

**Alternate solution continued:**

Using the performance curves for the infiltration basin (i.e., surface infiltration practice), Figures 3-8, IR = 0.27 in/hr and 3-9, IR = 0.52 in/hr, interpolate between the curves to determine the design storage volume of the BMP (BMP-Volume<sub>IA-in</sub>) needed to treat runoff from the contributing IA and achieve a P<sub>target</sub> = 70%.

First calculate the interpolation adjustment factor (IAF) to interpolate between the infiltration basin performance curves for infiltration rates of 0.27 and 0.52 in/hr:

$$IAF = (0.39 - 0.27) / (0.52 - 0.27) = 0.48$$

From the two performance curves, develop the following table to estimate the general magnitude of the needed storage volume for an infiltration swale with an IR = 0.39 in/hr and a P<sub>target</sub> of 70%.

**Table Example 3-1-1: Interpolation Table for determining design storage volume of infiltration basin with IR = 0.39 in/hr and a phosphorus load reduction target of 70%**

BMP Storage Volume	% Phosphorus Load Reduction IR = 0.27 in/hr (PR <sub>IR=0.27</sub> )	% Phosphorus Load Reduction IR = 0.52 in/hr (PR <sub>IR=0.52</sub> )	Interpolated % Phosphorus Load Reduction IR = 0.39 in/hr (PR <sub>IR=0.39</sub> ) PR <sub>IR=0.39</sub> = IAF(PR <sub>IR=0.52</sub> - PR <sub>IR=0.27</sub> ) + PR <sub>IR=0.27</sub>
0.3	64%	67%	65%
0.4	74%	77%	75%
0.5	79%	82%	80%

As indicated from Table Example 3-1, the BMP-Volume<sub>IA-in</sub> for PR<sub>IR=0.39</sub> of 70% is between 0.3 and 0.4 inches and can be determined by interpolation:

$$\begin{aligned} \text{BMP-Volume}_{IA-in} &= (70\% - 65\%) / (75\% - 65\%) \times (0.4 \text{ in} - 0.3 \text{ in}) + 0.3 \text{ in} \\ &= 0.35 \text{ inches} \end{aligned}$$

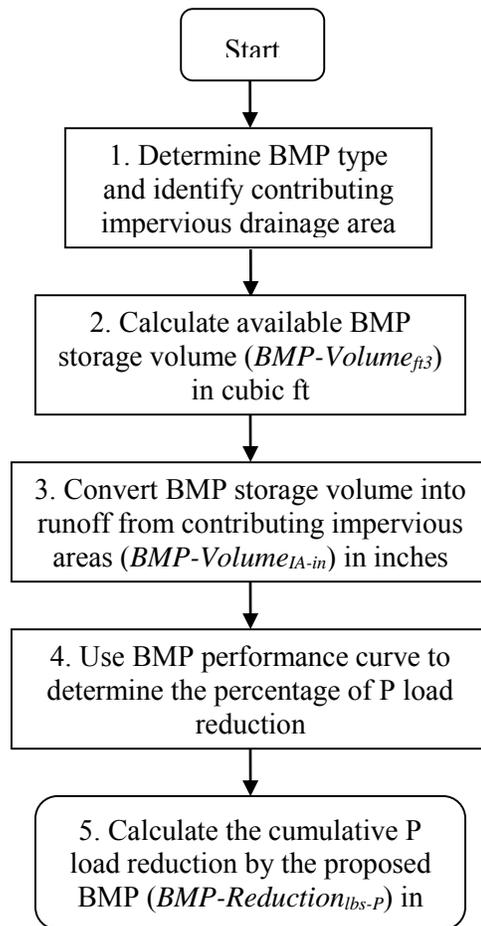
**5 alternative)** Convert the resulting BMP-Volume<sub>IA-in</sub> to cubic feet (BMP-Volume<sub>IA-ft<sup>3</sup></sub>) using equation 3-1:

$$\begin{aligned} \text{BMP-Volume}_{IA-ft^3} &= 2.57 \text{ acre} \times 0.35 \text{ in} \times 3,630 \text{ ft}^3/\text{acre-in} \\ &= \mathbf{3,265 \text{ ft}^3} \end{aligned}$$

**(2) Method to determine the phosphorus load reduction for a structural BMP with a known design volume when the contributing drainage area is 100% impervious:**

Flow Chart 2 illustrates the steps to determine the phosphorus load reduction for a structural BMP with a known design volume when the contributing drainage area is 100% impervious.

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**Flow Chart 2: Method to determine the phosphorus load reduction for a BMP with a known design volume when contributing drainage area is 100% impervious.**

- 1) Identify the structural BMP type and contributing impervious drainage area (IA);
- 2) Document the available storage volume ( $\text{ft}^3$ ) of the structural BMP (BMP-Volume  $\text{ft}^3$ ) using the BMP dimensions and design specifications (e.g., maximum storage depth, filter media porosity);
- 3) Convert BMP-Volume  $\text{ft}^3$  into inches of runoff from the contributing impervious area (BMP-Volume  $\text{IA-in}$ ) using equation 3-3:

$$\text{BMP-Volume}_{\text{IA-in}} = \text{BMP-Volume}_{\text{ft}^3} / \text{IA (acre)} \times 12 \text{ in/ft} \times 1 \text{ acre}/43560 \text{ ft}^2 \text{ (Equation 3-3)}$$

- 4) Determine the % phosphorus load reduction for the structural BMP (BMP Reduction  $\%_{\text{-P}}$ ) using the appropriate BMP performance curve (Figures 3-1 through 3-18) and the BMP-Volume  $\text{IA-in}$  calculated in step 3; and

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- 5) Calculate the cumulative phosphorus load reduction in pounds of phosphorus for the structural BMP (BMP Reduction<sub>lbs-P</sub>) using the BMP Load as calculated from the procedure described above and the percent phosphorus load reduction determined in step 4 by using equation 3-4:

$$\text{BMP Reduction}_{\text{lbs-P}} = \text{BMP Load} \times (\text{BMP Reduction}_{\%-\text{P}}/100) \quad \text{(Equation 3-4)}$$

**Example 3-2: Determine the phosphorus load reduction for a structural BMP with a known storage volume capacity when the contributing drainage area is 100% impervious:**

A permittee is considering a bio-filtration system to treat runoff from 1.49 acres of high density residential (HDR) impervious area. Site constraints would limit the bio-filtration system to have a surface area of 1200 ft<sup>2</sup> and the system would have to be located next to the impervious drainage area to be treated. The design parameters for the bio-filtration system are presented in Table Example 3-2-1.

**Table Example 3-2-1: Design parameters for bio-filtration system for Example 3-2**

Components of representation	Parameters	Value
Ponding	Maximum depth	0.5 ft
	Surface area	1200 ft <sup>2</sup>
	Vegetative parameter <sup>a</sup>	85-95%
Soil mix	Depth	2.5 ft
	Porosity	0.40
	Hydraulic conductivity	4 inches/hour
Gravel layer	Depth	0.67 ft
	Porosity	0.40
	Hydraulic conductivity	14 inches/hour
Orifice #1	Diameter	0.5 ft

<sup>a</sup> Refers to the percentage of surface covered with vegetation

Determine the:

- A) Percent phosphorus load reduction (BMP Reduction<sub>%-P</sub>) for the specified bio-filtration system and contributing impervious drainage area; and
- B) Cumulative phosphorus reduction in pounds that would be accomplished by the bio-filtration system (BMP-Reduction<sub>lbs-P</sub>)

**Solution:**

- 1) The BMP is a bio-filtration system that will treat runoff from 1.49 acres of impervious area (IA = 1.49 acre);
- 2) The available storage volume capacity (ft<sup>3</sup>) of the bio-filtration system (BMP-Volume<sub>BMP-ft<sup>3</sup></sub>) is determined using the surface area of the system, depth of ponding, and the porosity of the filter media:

$$\begin{aligned} \text{BMP-Volume}_{\text{BMP-ft}^3} &= (\text{surface area} \times \text{pond maximum depth}) + ((\text{soil mix depth} + \\ &\text{gravel layer depth})/12 \text{ in/ft}) \times \text{surface area} \times \text{gravel layer porosity}) \\ &= (1,200 \text{ ft}^2 \times 0.5 \text{ ft}) + ((38/12) \times 1,200 \text{ ft}^2 \times 0.4) \\ &= 2,120 \text{ ft}^3 \end{aligned}$$

**Solution continued:**

- 3) The available storage volume capacity of the bio-filtration system in inches of runoff from the contributing impervious area (BMP-Volume<sub>IA-in</sub>) is calculated using equation 3-3:

$$\begin{aligned} \text{BMP-Volume}_{\text{IA-in}} &= (\text{BMP-Volume}_{\text{ft}^3} / \text{IA (acre)} \times 12 \text{ in/ft} \times 1 \text{ acre} / 43560 \text{ ft}^2) \\ \text{BMP-Volume}_{\text{IA-in}} &= (2120 \text{ ft}^3 / 1.49 \text{ acre}) \times 12 \text{ in/ft} \times 1 \text{ acre} / 43560 \text{ ft}^2 \\ &= 0.39 \text{ in} \end{aligned}$$

- 4) Using the bio-filtration performance curve shown in Figure 3-13, a **51%** phosphorus load reduction (BMP Reduction %<sub>-P</sub>) is determined for a bio-filtration system sized for 0.39 in of runoff from 1.49 acres of impervious area; and
- 5) Calculate the cumulative phosphorus load reduction in pounds of phosphorus for the bio-filtration system (BMP Reduction<sub>lbs-P</sub>) using the BMP Load as calculated from the procedure described above and the BMP Reduction %<sub>-P</sub> determined in step 4 by using equation 3-4. First, the BMP Load is determined as specified above:

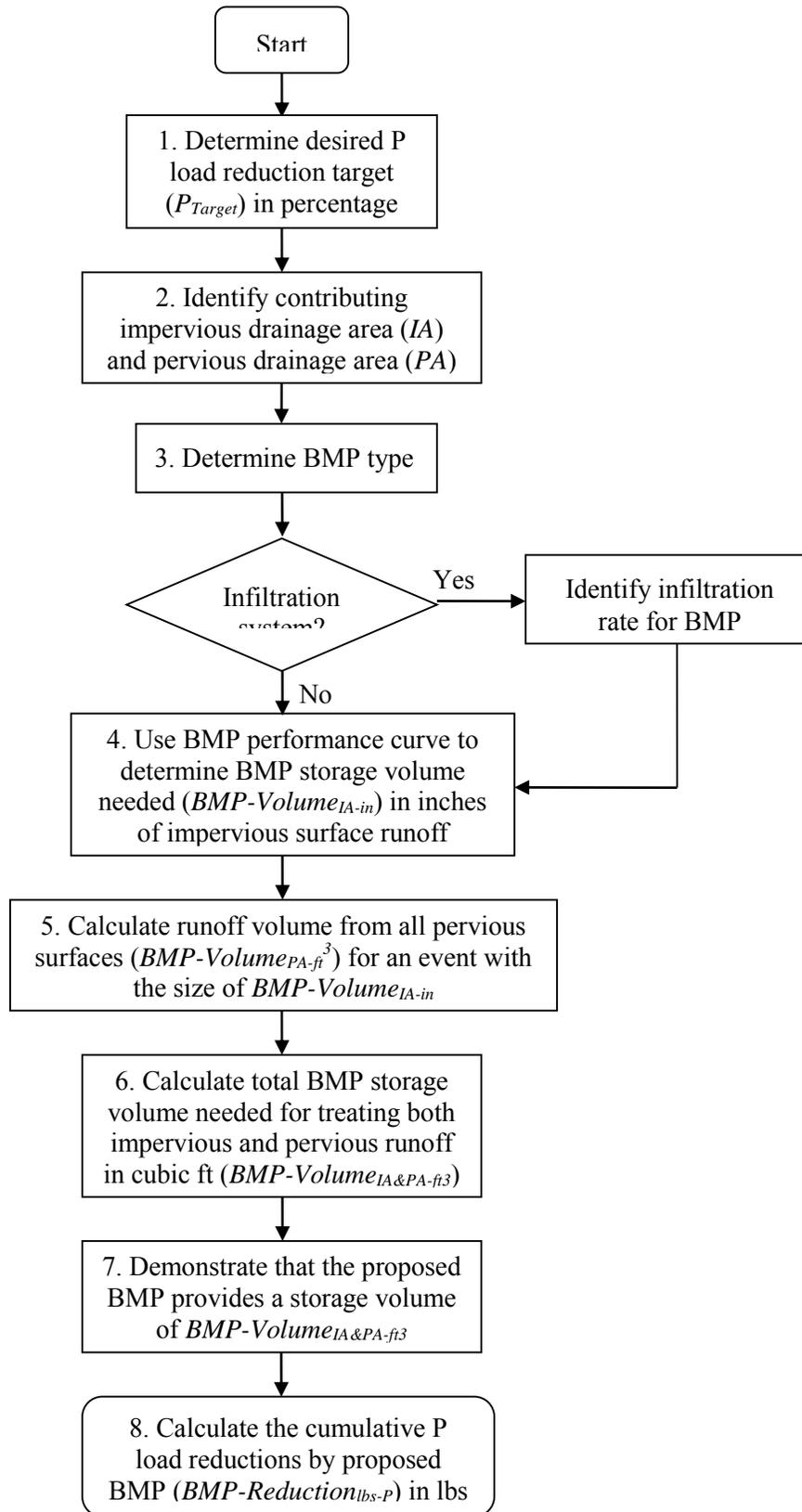
$$\begin{aligned} \text{BMP Load} &= \text{IA} \times \text{impervious cover phosphorus export loading rate for HDR (see Table 3-1)} \\ &= 1.49 \text{ acres} \times 2.32 \text{ lbs/acre/yr} \\ &= 3.46 \text{ lbs/yr} \end{aligned}$$

$$\begin{aligned} \text{BMP Reduction}_{\text{lbs-P}} &= \text{BMP Load} \times (\text{BMP Reduction}_{\%-\text{P}} / 100) \\ \text{BMP Reduction}_{\text{lbs-P}} &= 3.46 \text{ lbs/yr} \times (51 / 100) \\ &= \mathbf{1.76 \text{ lbs/yr}} \end{aligned}$$

**(3) Method to determine the design storage volume of a structural BMP to achieve a known phosphorus load reduction target when the contributing drainage area has impervious and pervious surfaces:**

Flow Chart 3 illustrates the steps to determine the design storage volume of a structural BMP to achieve a known phosphorus load reduction target when the contributing drainage area has impervious and pervious surfaces.

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**Flow Chart 3: Method to determine the design storage volume of a BMP to reach a known P load reduction when both impervious and pervious drainage areas are present.**

- 1) Determine the desired cumulative phosphorus load reduction target ( $P_{target}$ ) in percentage for the structural BMP;
- 2) Characterize the contributing drainage area to the structural BMP by identifying the following information for the impervious and pervious surfaces:  
**Impervious area (IA)** - Area (acre) and land use (e.g., commercial)

**Pervious area (PA)** – Area (acre) and runoff depths based on hydrologic soil group (HSG) and rainfall depth. Table 3-3 provides values of runoff depth from pervious areas for various rainfall depths and HSGs. Soils are assigned to an HSG on the basis of their permeability. HSG A is the most permeable, and HSG D is the least permeable. HSG categories for pervious areas in the drainage area shall be estimated by consulting local soil surveys prepared by the National Resource Conservation Service (NRCS) or by a storm water professional evaluating soil testing results from the drainage area. If the HSG condition is not known, a HSG D soil condition should be assumed.

**Table 3- 3: Developed Land Pervious Area Runoff Depths based on Precipitation depth and Hydrological Soil Groups (HSGs)**

Developed Land Pervious Area Runoff Depths based on Precipitation depth and Hydrological Soil Groups					
Rainfall Depth, Inches	Runoff Depth, inches				
	Pervious HSG A	Pervious HSG B	Pervious HSG C	Pervious HSG C/D	Pervious HSG D
0.10	0.00	0.00	0.00	0.00	0.00
0.20	0.00	0.00	0.01	0.02	0.02
0.40	0.00	0.00	0.03	0.05	0.06
0.50	0.00	0.01	0.05	0.07	0.09
0.60	0.01	0.02	0.06	0.09	0.11
0.80	0.02	0.03	0.09	0.13	0.16
1.00	0.03	0.04	0.12	0.17	0.21
1.20	0.04	0.05	0.14	0.27	0.39
1.50	0.08	0.11	0.39	0.55	0.72
2.00	0.14	0.22	0.69	0.89	1.08

Notes: Runoff depths derived from combination of volumetric runoff coefficients from Table 5 of *Small Storm Hydrology and Why it is Important for the Design of Stormwater Control Practices*, (Pitt, 1999), and using the Stormwater Management Model (SWMM) in continuous model mode for hourly precipitation data for Boston, MA, 1998-2002.

- 3) Determine the structural BMP type (e.g., infiltration trench, gravel wetland). For infiltration systems, determine the appropriate infiltration rate for the location of the BMP in the Watershed;
- 4) Using the cumulative phosphorus removal performance curve for the selected structural BMP, determine the storage volume capacity of the BMP in inches needed to treat runoff from the contributing impervious area (BMP-Volume<sub>IA-in</sub>);

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- 5) Using Equation 3-5 below and the pervious area runoff depth information from Table 3-3-1, determine the total volume of runoff from the contributing pervious drainage area in cubic feet (BMP Volume<sub>PA-ft<sup>3</sup></sub>) for a rainfall size equal to the sum of BMP Volume<sub>IA-in</sub>, determined in step 4. The runoff volume for each distinct pervious area must be determined;

$$\text{BMP-Volume}_{\text{PA-ft}^3} = \sum (\text{PA} \times (\text{runoff depth}) \times 3,630 \text{ ft}^3/\text{acre-in}) \quad (\text{PA}_1, \dots, \text{PA}_n)$$

**(Equation 3-5)**

- 6) Using equation 3-6 below, calculate the BMP storage volume in cubic feet (BMP-Volume<sub>IA&PA-ft<sup>3</sup></sub>) needed to treat the runoff depth from the contributing impervious (IA) and pervious areas (PA);

$$\text{BMP-Volume}_{\text{IA\&PA-ft}^3} = \text{BMP Volume}_{\text{PA-ft}^3} + (\text{BMP Volume}_{\text{IA-in}} \times \text{IA (acre)}) \times 3,630 \text{ ft}^3/\text{acre-in}$$

**(Equation 3-6)**

- 7) Provide supporting calculations using the dimensions and specifications of the proposed structural BMP showing that the necessary storage volume determined in step 6, BMP-Volume<sub>IA&PA-ft<sup>3</sup></sub>, will be provided to achieve the P<sub>Target</sub>; and
- 8) Calculate the cumulative phosphorus load reduction in pounds of phosphorus (BMP-Reduction<sub>lbs-P</sub>) for the structural BMP using the BMP Load (as calculated from the procedure in Attachment 1 to Appendix F) and the P<sub>target</sub> by using equation 3-2:

$$\text{BMP-Reduction}_{\text{lbs-P}} = \text{BMP Load} \times (\text{P}_{\text{target}} / 100) \quad \text{(Equation 3-2)}$$

**Example 3-3: Determine the design storage volume of a structural BMP to achieve a known phosphorus load reduction target when the contributing drainage area has impervious and pervious surfaces**

A permittee is considering a gravel wetland system to treat runoff from a high-density residential (HDR) site. The site is 7.50 acres of which 4.00 acres are impervious surfaces and 3.50 acres are pervious surfaces. The pervious area is made up of 2.5 acres of lawns in good condition surrounding cluster housing units and 1.00 acre of stable unmanaged woodland. Soils information indicates that all of the woodland and 0.50 acres of the lawn is hydrologic soil group (HSG) B and the other 2.00 acres of lawn are HSG C. The permittee wants to size the gravel wetland system to achieve a cumulative phosphorus load reduction (P<sub>Target</sub>) of 55% from the entire 7.50 acres.

Determine the:

- A)** Design storage volume needed for a gravel wetland system to achieve a 55% reduction in annual phosphorus load from the contributing drainage area (BMP-Volume<sub>IA&PA-ft<sup>3</sup></sub>); and
- B)** Cumulative phosphorus reduction in pounds that would be accomplished by the BMP (BMP-Reduction<sub>lbs-P</sub>)

**Example 3-3 continued:**

**Solution:**

- 1) The BMP type is gravel wetland system.
- 2) The phosphorus load reduction target ( $P_{\text{Target}} = 55\%$ ).
- 3) Using the cumulative phosphorus removal performance curve for the gravel wetland system shown in Figure 3-14, the storage volume capacity in inches needed to treat runoff from the contributing impervious area (BMP Volume  $_{\text{IA-in}}$ ) is 0.71 in;

Using equation 3-5 and the pervious runoff depth information from Table 3-3, the volume of runoff from the contributing pervious drainage area in cubic feet (BMP Volume  $_{\text{PA-ft}^3}$ ) for a rainfall size equal to 0.71 in is summarized in Table Example 3-3-A. As indicated from Table 3-3, the runoff depth for a rainfall size equal to 0.71 inches is between 0.6 and 0.8 inches and can be determined by interpolation (example shown for runoff depth of HSG C):

$$\begin{aligned} \text{Runoff depth (HSG C)} &= (0.71 - 0.6)/(0.8 - 0.6) \times (0.09 \text{ in} - 0.06 \text{ in}) + 0.06 \text{ in} \\ &= 0.07 \text{ inches} \end{aligned}$$

**Table Example 3-3-A: Runoff contributions from pervious areas for HDR site**

ID	Type	Pervious Area (acre)	HSG	Runoff (in)	Runoff = (runoff) x PA (acre-in)	Runoff = Runoff (acre-in) x 3630 $\text{ft}^3/\text{acre-in}$ ( $\text{ft}^3$ )
PA1	Grass	2.00	C	0.07	0.14	508
PA2	Grass	0.50	B	0.01	0.0	0.0
PA3	Woods	1.00	B	0.01	0.0	0.0
<b>Total</b>	-----	<b>3.50</b>	-----	-----	<b>0.14</b>	<b>508</b>

- 4) Using equation 3-6, determine the BMP storage volume in cubic feet (BMP-Volume  $_{\text{IA\&PA-ft}^3}$ ) needed to treat 0.71 inches of runoff from the contributing impervious area (IA) and the runoff of 0.14 acre-in from the contributing pervious areas, determined in step 5 is:

$$\text{BMP Volume}_{\text{IA\&PA-ft}^3} = \text{BMP Volume}_{\text{PA ac-in}} + (\text{BMP Volume}_{\text{IA-in}} \times \text{IA (acre)}) \times 3,630 \text{ ft}^3/\text{acre-in}$$

$$\begin{aligned} \text{BMP Volume}_{\text{IA\&PA-ft}^3} &= (508 \text{ ft}^3 + (0.71 \text{ in} \times 4.00 \text{ acre})) \times 3,630 \text{ ft}^3/\text{acre-in} \\ &= 10,817 \text{ ft}^3 \end{aligned}$$

- 5) Table Example 3-3-B provides design details for of a potential gravel wetland system

**Solution continued:**

**Table Example 3-3-B: Design details for gravel wetland system**

Gravel Wetland System Components	Design Detail	Depth (ft)	Surface Area (ft <sup>2</sup> )	Volume (ft <sup>3</sup> )
<b>Sediment Forebay</b>	<b>10% of Treatment Volume</b>			
Pond area	---	1.33	896	1,192
<b>Wetland Cell #1</b>	<b>45% of Treatment Volume</b>	-----	-----	-----
Pond area	---	2.00	1,914	3,828
Gravel layer	porosity = 0.4	2.00	1,914	1,531
<b>Wetland Cell #2</b>	<b>45% of Treatment Volume</b>	-----	-----	-----
Pond area	---	2.00	1,914	3,828
Gravel layer	porosity = 0.4	2.00	1,914	1,531

The total design storage volume for the proposed gravel wetland system identified in Table Example 3-3-C is 11,910 ft<sup>3</sup>. This volume is greater than 11,834 ft<sup>3</sup> ((BMP-Volume<sub>IA&PA-ft<sup>3</sup></sub>), calculated in step 6) and is therefore sufficient to achieve a P<sub>Target</sub> of 55%.

- 6) The cumulative phosphorus load reduction in pounds of phosphorus (BMP-Reduction<sub>lbs-P</sub>) for the proposed gravel wetland system is calculated by using equation 3-2 with the BMP Load and the P<sub>target</sub> = 55%.

$$\text{BMP-Reduction}_{\text{lbs-P}} = \text{BMP Load} \times (\text{P}_{\text{target}} / 100) \quad \text{(Equation 3-2)}$$

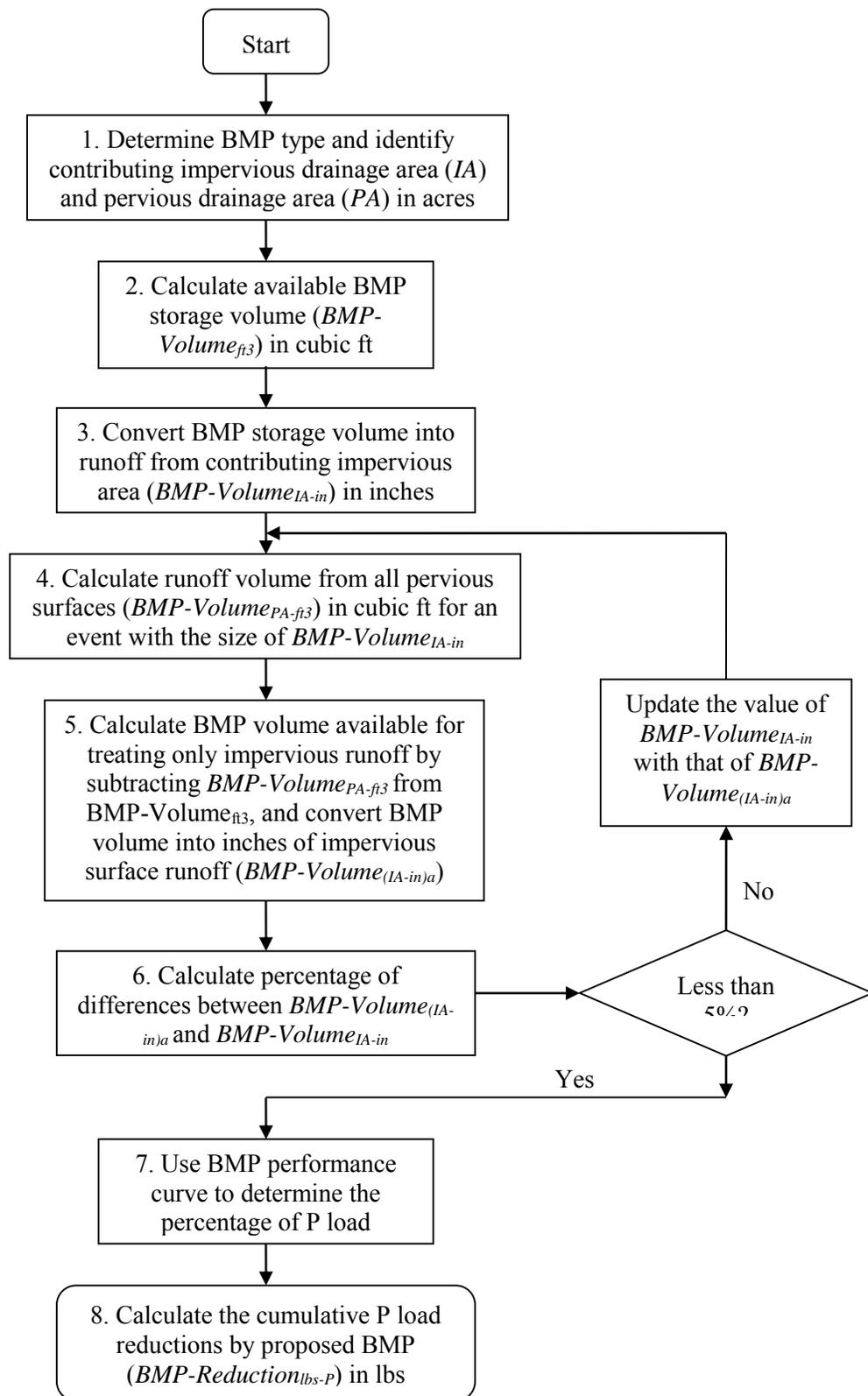
Using Table 3-1, the BMP Load is calculated:

$$\begin{aligned} \text{BMP Load} &= (\text{IA} \times \text{PLER}_{\text{HDR}}) + (\text{PA}_{\text{lawn HSG B}} \times \text{PLER}_{\text{HSG B}}) + (\text{PA}_{\text{lawn HSG C}} \times \text{PLER}_{\text{HSG C}}) + (\text{PA}_{\text{forest}} \times \text{PA}_{\text{PLER}_{\text{For}}}) \\ &= (4.00 \text{ acre} \times 2.32 \text{ lbs/acre/yr}) + (0.50 \text{ acres} \times 0.12 \text{ lbs/acre/yr}) + (1.00 \text{ acre} \times 0.21 \text{ lbs/acre/yr}) + (1.00 \text{ acres} \times 0.13) \\ &= 9.68 \text{ lbs/yr} \\ \text{BMP-Reduction}_{\text{lbs-P}} &= \text{BMP Load} \times (\text{P}_{\text{target}} / 100) \\ \text{BMP-Reduction}_{\text{lbs-P}} &= 9.68 \text{ lbs/yr} \times 55/100 \\ &= \mathbf{5.32 \text{ lbs/yr}} \end{aligned}$$

**(4) Method to determine the phosphorus load reduction for a structural BMP with a known storage volume when the contributing drainage area has impervious and pervious surfaces:**

Flow Chart 4 illustrates the steps to determine the phosphorus load reduction for a structural BMP with a known storage volume when the contributing drainage area has impervious and pervious surfaces.

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**Flow Chart 4: Method to determine the phosphorus load reduction for a BMP with known storage volume when both pervious and impervious drainage areas are present.**

- 1) Identify the type of structural BMP and characterize the contributing drainage area to the structural BMP by identifying the following information for the impervious and pervious surfaces:

**Impervious area (IA)** – Area (acre) and land use (e.g., commercial)

**Pervious area (PA)** – Area (acre) and runoff depth based on hydrologic soil group (HSG) and size of rainfall event. Table 3-3 provides values of runoff depth for various rainfall depths and HSGs. Soils are assigned to an HSG based on their permeability. HSG categories for pervious areas in the Watershed shall be estimated by consulting local soil surveys prepared by the National Resource Conservation Service (NRCS) or by a storm water professional evaluating soil testing results from the Watershed. If the HSG condition is not known, a HSG C/D soil condition should be assumed.

- 2) Determine the available storage volume (ft<sup>3</sup>) of the structural BMP (BMP-Volume ft<sup>3</sup>) using the BMP dimensions and design specifications (e.g., maximum storage depth, filter media porosity);
- 3) To estimate the phosphorus load reduction of a BMP with a known storage volume capacity, it is first necessary to determine the portion of available BMP storage capacity (BMP-Volume ft<sup>3</sup>) that would treat the runoff volume generated from the contributing impervious area (IA) for a rainfall event with a depth of *i* inches (in). This will require knowing the corresponding amount of runoff volume that would be generated from the contributing pervious area (PA) for the same rainfall event (depth of *i* inches). Using equation 3-6a below, solve for the BMP capacity that would be available to treat runoff from the contributing impervious area for the unknown rainfall depth of *i* inches (see equation 3-6b):

$$\text{BMP-Volume}_{\text{ft}^3} = \text{BMP-Volume}_{(\text{IA-ft}^3)_i} + \text{BMP-Volume}_{(\text{PA-ft}^3)_i} \quad \text{(Equation 3-6a)}$$

Where:

BMP-Volume<sub>ft<sup>3</sup></sub> = the available storage volume of the BMP;

BMP-Volume<sub>(IA-ft<sup>3</sup>)<sub>i</sub></sub> = the available storage volume of the BMP that would fully treat runoff generated from the contributing impervious area for a rainfall event of size *i* inches; and

BMP-Volume<sub>(PA-ft<sup>3</sup>)<sub>i</sub></sub> = the available storage volume of the BMP that would fully treat runoff generated from the contributing pervious area for a rainfall event of size *i* inches

Solving for BMP-Volume<sub>(IA-ft<sup>3</sup>)<sub>i</sub></sub>:

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$$\text{BMP-Volume}_{(IA-ft^3)_i} = \text{BMP-Volume}_{ft^3} - \text{BMP-Volume}_{(PA-ft^3)_i} \quad \text{(Equation 3-6b)}$$

To determine BMP-Volume<sub>(IA-ft<sup>3</sup>)<sub>i</sub></sub>, requires performing an iterative process of refining estimates of the rainfall depth used to calculate runoff volumes until the rainfall depth used results in the sum of runoff volumes from the contributing IA and PA equaling the available BMP storage capacity (BMP-Volume<sub>ft<sup>3</sup></sub>). For the purpose of estimating BMP performance, it will be considered adequate when the IA runoff depth (in) is within 5% IA runoff depth used in the previous iteration.

For the first iteration (1), convert the BMP-Volume<sub>ft<sup>3</sup></sub> determined in step 2 into inches of runoff from the contributing impervious area (BMP Volume<sub>(IA-in)<sub>1</sub></sub>) using equation 3-7a.

$$\text{BMP-Volume}_{(IA-in)_1} = (\text{BMP-Volume}_{ft^3} / \text{IA (acre)}) \times (12 \text{ in/ft} / 43,560 \text{ ft}^2/\text{acre}) \quad \text{(Equation 3-7a)}$$

For iterations 2 through n (2...n), convert the BMP Volume<sub>(IA-ft<sup>3</sup>)<sub>2...n</sub></sub>, determined in step 5a below, into inches of runoff from the contributing impervious area (BMP Volume<sub>(IA-in)<sub>2...n</sub></sub>) using equation 3-7b.

$$\text{BMP-Volume}_{(IA-in)_{2...n}} = (\text{BMP-Volume}_{(IA-ft^3)_{2...n}} / \text{IA (acre)}) \times (12 \text{ in/ft} / 43,560 \text{ ft}^2/\text{acre}) \quad \text{(Equation 3-7b)}$$

- 4) For 1 to n iterations, use the pervious runoff depth information from Table 3-3 and equation 3-8 to determine the total volume of runoff (ft<sup>3</sup>) from the contributing PA (BMP Volume<sub>PA-ft<sup>3</sup></sub>) for a rainfall size equal to the sum of BMP-Volume<sub>(IA-in)<sub>1</sub></sub>, determined in step 3. The runoff volume for each distinct pervious area must be determined.

$$\text{BMP Volume}_{(PA-ft^3)_{1...n}} = \sum ((\text{PA} \times (\text{runoff depth})_{(PA1, PA2...PAN)}) \times (3,630 \text{ ft}^3/\text{acre-in})) \quad \text{(Equation 3-8)}$$

- 5) For iteration 1, estimate the portion of BMP Volume that is available to treat runoff from only the IA by subtracting BMP-Volume<sub>PA-ft<sup>3</sup></sub>, determined in step 4, from BMP-Volume<sub>ft<sup>3</sup></sub>, determined in step 2, and convert to inches of runoff from IA (see equations 3-9a and 3-9b):

$$\text{BMP-Volume}_{(IA-ft^3)_2} = ((\text{BMP-Volume}_{ft^3} - \text{BMP Volume}_{(PA-ft^3)_1}) \quad \text{(Equation 3-9a)}$$

$$\text{BMP-Volume}_{(IA-in)_2} = (\text{BMP-Volume}_{(IA-ft^3)_2} / \text{IA (acre)}) \times (12 \text{ in/ft} \times 1 \text{ acre} / 43,560 \text{ ft}^2) \quad \text{(Equation 3-9b)}$$

If additional iterations (i.e., 2 through n) are needed, estimate the portion of BMP volume that is available to treat runoff from only the IA (BMP-Volume<sub>(IA-in)<sub>3...n+1</sub></sub>) by subtracting BMP Volume<sub>(PA-ft<sup>3</sup>)<sub>2...n</sub></sub>, determined in step 4, from BMP Volume<sub>(IA-ft<sup>3</sup>)<sub>3...n+1</sub></sub>, determined in step 5, and by converting to inches of runoff from IA using equation 3-9b):

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- 6) For iteration a (an iteration between 1 and n+1), compare BMP Volume  $(IA-in)_a$  to BMP Volume  $(IA-in)_{a-1}$  determined from the previous iteration (a-1). If the difference in these values is greater than 5% of BMP Volume  $(IA-in)_a$  then repeat steps 4 and 5, using BMP Volume  $(IA-in)_a$  as the new starting value for the next iteration (a+1). If the difference is less than or equal to 5 % of BMP Volume  $(IA-in)_a$  then the permittee may proceed to step 7;
- 7) Determine the % phosphorus load reduction for the structural BMP (BMP Reduction %<sub>-P</sub>) using the appropriate BMP performance curve and the BMP-Volume  $(IA-in)_n$  calculated in the final iteration of step 5; and
- 8) Calculate the cumulative phosphorus load reduction in pounds of phosphorus for the structural BMP (BMP Reduction <sub>lbs-P</sub>) using the BMP Load as calculated from the procedure in Attachment 1 to Appendix F and the percent phosphorus load reduction (BMP Reduction %<sub>-P</sub>) determined in step 7 by using equation 3-4:

$$\text{BMP Reduction}_{\text{lbs-P}} = \text{BMP Load} \times (\text{BMP Reduction}_{\%-\text{P}}/100) \quad \text{(Equation 3-4)}$$

**Example 3-4: Determine the phosphorus load reduction for a structural BMP with a known design volume when the contributing drainage area has impervious and pervious surfaces**

A permittee is considering an infiltration basin to capture and treat runoff from a portion of the medium density residential area (MDR). The contributing drainage area is 16.55 acres and has 11.75 acres of impervious area and 4.8 acres of pervious area (PA) made up mostly of lawns and landscaped areas that is 80% HSG D and 20% HSG C. An infiltration basin with the following specifications can be placed at the down-gradient end of the contributing drainage area where soil testing results indicates an infiltration rate (IR) of 0.28 in/hr:

**Table Example 3-4-A: Infiltration basin characteristics**

Structure	Bottom area (acre)	Top surface area (acre)	Maximum pond depth (ft)	Design storage volume (ft <sup>3</sup> )	Infiltration Rate (in/hr)
Infiltration basin	0.65	0.69	1.65	48,155	0.28

Determine the:

- A) Percent phosphorus load reduction (BMP Reduction %<sub>-P</sub>) for the specified infiltration basin and the contributing impervious and pervious drainage area; and
- B) Cumulative phosphorus reduction in pounds that would be accomplished by the BMP (BMP-Reduction <sub>lbs-P</sub>)

**Example continued:****Solution:**

- 1) A surface infiltration basin is being considered. Information for the contributing impervious (IA) and pervious (PA) areas are summarized in Tables Example 3-4-A and Example 3-4-B, respectively.

**Table Example 3-4-B: Impervious area characteristics**

ID	Land use	Area (acre)
IA1	MDR	11.75

**Table Example 3-4-C: Pervious area characteristics**

ID	Area (acre)	Hydrologic Soil Group (HSG)
PA1	3.84	D
PA2	0.96	C

- 2) The available storage volume ( $\text{ft}^3$ ) of the infiltration basin (BMP-Volume  $\text{ft}^3$ ) is determined from the design details and basin dimensions; BMP-Volume  $\text{ft}^3 = 48,155 \text{ ft}^3$ .
- 3) To determine what the BMP design storage volume is in terms of runoff depth (in) from IA, an iterative process is undertaken:

**Solution Iteration 1**

For the first iteration (1), the BMP-Volume $\text{ft}^3$  is converted into inches of runoff from the contributing impervious area (BMP Volume  $(\text{IA-in})_1$ ) using equation 3-5a.

$$\begin{aligned} \text{BMP Volume } (\text{IA-in})_1 &= (48,155 \text{ ft}^3 / 11.75 \text{ acre}) \times (12 \text{ in/ft} / 43,560 \text{ ft}^2/\text{acre}) \\ &= 1.13 \text{ in} \end{aligned}$$

- 4-1) The total volume of runoff ( $\text{ft}^3$ ) from the contributing PA (BMP Volume  $\text{PA-ft}^3$ ) for a rainfall size equal to the sum of BMP Volume  $(\text{IA-in})_1$  determined in step 3 is determined for each distinct pervious area identified in Table Example 3-4-B using the information from Table 3-3 and equation 3-5. Interpolation was used to determine runoff depths.

$$\begin{aligned} \text{BMP Volume } (\text{PA-ft}^3)_1 &= ((3.84 \text{ acre} \times (0.33 \text{ in})) + (0.96 \text{ acre} \times (0.13 \text{ in})) \times 3,630 \text{ ft}^3/\text{acre-in} \\ &= 5052 \text{ ft}^3 \end{aligned}$$

- 5-1) For iteration 1, the portion of BMP Volume that is available to treat runoff from only the IA is estimated by subtracting the BMP Volume  $(\text{PA-ft}^3)_1$ , determined in step 4-1, from BMP Volume $\text{ft}^3$ , determined in step 2, and converted to inches of runoff from IA:

$$\begin{aligned} \text{BMP Volume } (\text{IA-ft}^3)_2 &= 48,155 \text{ ft}^3 - 5052 \text{ ft}^3 \\ &= 43,103 \text{ ft}^3 \end{aligned}$$

$$\begin{aligned} \text{BMP Volume } (\text{IA-in})_2 &= (43,103 \text{ ft}^3 / 11.75 \text{ acre}) \times (12 \text{ in/ft} \times 1 \text{ acre} / 43,560 \text{ ft}^2) \\ &= 1.01 \text{ in} \end{aligned}$$

**Solution continued:**

- 6-1)** The % difference between BMP Volume  $(IA-in)_2$ , 1.01 in, and BMP Volume  $(IA-in)_1$ , 1.13 in is determined and found to be significantly greater than 5%:

$$\begin{aligned}\% \text{ Difference} &= ((1.13 \text{ in} - 1.01 \text{ in}) / 1.01 \text{ in}) \times 100 \\ &= 12\%\end{aligned}$$

Therefore, steps 4 through 6 are repeated starting with BMP Volume  $(IA-in)_2 = 1.01$  in.

**Solution Iteration 2**

- 4-2)**  $BMP\text{-Volume}_{(PA-ft^3)_2} = ((3.84 \text{ acre} \times 0.21 \text{ in}) + (0.96 \text{ acre} \times 0.12 \text{ in})) \times 3,630 \text{ ft}^3/\text{acre-in}$   
 $= 3,358 \text{ ft}^3$

- 5-2)**  $BMP\text{-Volume}_{(IA-ft^3)_3} = 48,155 \text{ ft}^3 - 3,358 \text{ ft}^3$   
 $= 44,797 \text{ ft}^3$

$$\begin{aligned}BMP\text{-Volume}_{(IA-in)_3} &= (44,797 \text{ ft}^3 / 11.75 \text{ acre}) \times (12 \text{ in/ft} \times 1 \text{ acre} / 43,560 \text{ ft}^2) \\ &= 1.05 \text{ in}\end{aligned}$$

- 6-2)** % Difference =  $((1.05 \text{ in} - 1.01 \text{ in}) / 1.05 \text{ in}) \times 100$   
 $= 4\%$

The difference of 4% is acceptable.

- 7)** The % phosphorus load reduction for the infiltration basin (BMP Reduction %-P) is determined by using the infiltration basin performance curve for an infiltration rate of 0.27 in/hr and the treatment volume ( $BMP\text{-Volume}_{Net\ IA-in} = 1.05$  in) calculated in step 5-2 and is **BMP Reduction %-P = 93%**.

The performance curve for IR = 0.27 is used rather than interpolating between the performance curves for IR = 0.27 in/hr and 0.52 in/hr to estimate performance for IR = 0.28 in/hr. An evaluation of the performance curves for IR = 0.27 in/hr and IR = 0.52 in/hr for a design storage volume of 1.05 in indicate a small difference in estimated performance (BMP Reduction %-P = 93% for IR = 0.27 in/hr and BMP Reduction %-P = 95% for IR = 0.52 in/hr).

- 8)** The cumulative phosphorus load reduction in pounds of phosphorus ( $BMP\text{-Reduction}_{lbs-P}$ ) for the proposed infiltration basin is calculated by using equation 3-2 with the BMP Load and the  $P_{target}$  of 93%.

$$BMP\text{-Reduction}_{lbs-P} = BMP \text{ Load} \times (P_{target} / 100) \quad \text{(Equation 3-2)}$$

Using Table 3-1, the BMP load is calculated:

$$\begin{aligned}BMP \text{ Load} &= (IA \times \text{impervious cover phosphorus export loading rate for industrial}) \\ &\quad + (PA_{HSG D} \times \text{pervious cover phosphorus export loading rate for HSG D}) \\ &\quad + (PA_{HSG C} \times \text{pervious cover phosphorus export loading rate for HSG C})\end{aligned}$$

**Solution continued:**

$$= (11.75 \text{ acre} \times 1.96 \text{ lbs/acre/yr}) + (3.84 \text{ acre} \times 0.37 \text{ lbs/acre/yr}) \\ + (0.96 \text{ acre} \times 0.21 \text{ lbs/acre/yr}) \\ = 24.65 \text{ lbs/yr}$$

$$\text{BMP-Reduction}_{\text{lbs-P}} = 24.22 \text{ lbs/yr} \times 93/100 = \mathbf{22.93 \text{ lbs/yr}}$$

**Example 3-5: Determine the phosphorus load reduction for disconnecting impervious area using storage with delayed release.**

A commercial operation has an opportunity to divert runoff from 0.75 acres of impervious roof top to a 5000 gallon (668.4 ft<sup>3</sup>) storage tank for temporary storage and subsequent release to 0.09 acres of pervious area (PA) with HSG C soils.

Determine the:

- A) Percent phosphorus load reduction rates (BMP Reduction %<sub>-P</sub>) for the specified impervious area (IA) disconnection and storage system assuming release times of 1, 2 and 3 days for the stored volumes to discharge to the pervious area; and
- B) Cumulative phosphorus reductions in pounds that would be accomplished by the system (BMP-Reduction<sub>lbs-P</sub>) for the three storage release times, 1, 2 and 3 days.

**Solution:**

1. Determine the storage volume in units of inches of runoff depth from contributing impervious area:  

$$\text{Storage Volume}_{\text{IA-in}} = (668.4 \text{ ft}^3 / (0.75 \text{ acre} \times 43.560 \text{ ft}^2/\text{acre})) \times 12 \text{ inch/ft} \\ = 0.25 \text{ inches}$$
2. Determine the ratio of the contributing impervious area to the receiving pervious area:  

$$\text{IA:PA} = 0.75 \text{ acres} / 0.09 \text{ acres} \\ = 8.3$$
3. Using Table 3-21 for a IA:PA ratio of 8:1, determine the phosphorus load reduction rates for a storage volume of 0.25 inches that discharges to HSG C with release rates of 1, 2 and 3 days: Using interpolation the reduction rates are shown in Table 3-5-A:

**Table Example 3-5-A: Reduction Rates**

Percent Phosphorus load reduction for IA disconnection with storage HSG C			
Storage Volume <sub>IA-in</sub>	Storage release rate, days		
	1	2	3
0.25	39%	42%	43%

4. The cumulative phosphorus load reduction in pounds of phosphorus for the IA disconnection with storage (BMP-Reduction<sub>lbs-P</sub>) is calculated using Equation 3-2. The BMP Load is first determined using the method described above.

**Solution continued:**

$$\begin{aligned} \text{BMP Load} &= \text{IA} \times \text{phosphorus export loading rate for commercial IA (see Table 3-1)} \\ &= 0.75 \text{ acres} \times 1.78 \text{ lbs/acre/yr} \\ &= 1.34 \text{ lbs/yr} \end{aligned}$$

$$\text{BMP Reduction}_{\text{lbs-P}} = \text{BMP Load} \times (\text{BMP Reduction}_{\%-\text{P}}/100)$$

$$\begin{aligned} \text{BMP Reduction}_{\text{lbs-P}} &= 1.34 \text{ lbs/yr} \times (39/100) \\ &= \mathbf{0.53 \text{ lbs/yr}} \end{aligned}$$

Table Example 3-5-B presents the BMP Reduction<sub>lbs-P</sub> for each of the release rates:

**Table Example 3-5-B: Reduction Load**

Phosphorus load reduction for IA disconnection with storage HSG C, lbs			
Storage Volume <sub>IA-in</sub>	Storage release rate, days		
	1	2	3
0.25	0.53	0.56	0.58

**Example 3-6: Determine the phosphorus load reduction for disconnecting impervious area with and without soil augmentation in the receiving pervious area.**

The same commercial property as in example 3-5 wants to evaluate disconnecting drainage from the 0.75 acre impervious roof top and discharging it directly to 0.09 acres of pervious area (PA) with HSG C. Also, the property has the opportunity to purchase a small adjoining area (0.06 acres), also HSG C, to increase the size of the receiving PA from 0.09 to 0.15 acres and to allow the property owner to avoid having to install a drainage structure to capture overflow runoff from the PA. The property owner has been informed that the existing PA soil can be tilled and augmented with soil amendments to support denser vegetative growth and improve hydrologic function to approximate HSG B.

Determine the:

- A) Percent phosphorus load reduction rates (BMP Reduction<sub>%-P</sub>) for the specified impervious area (IA) disconnection to both the 0.09 and 0.15 acre receiving PAs with and without soil augmentation; and
- B) Cumulative phosphorus reductions in pounds that would be accomplished by the IA disconnection for the various scenarios (BMP-Reduction<sub>lbs-P</sub>).

**Solution:**

1. Determine the ratio of the contributing impervious area to the receiving pervious area:
  - IA:PA = 0.75 acres/0.09 acres  
= 8.3
  - IA:PA = 0.75 acres/0.15 acres  
= 5.0

**Solution Continued:**

- Using Table 3-26 and Figure 3-40 for a IA:PA ratios of 8:1 and 5:1, respectively, determine the phosphorus load reduction rates for IA disconnections to HSG C and HSG B:

**Table Example 3-6-A: Reduction Rates**

Percent Phosphorus load reduction rates for IA disconnection		
Receiving PA	IA:PA	
	8:1	5:1
HSG C	7%	14%
HSG B (soil augmentation)	14%	22%

- The cumulative phosphorus load reduction in pounds of phosphorus for the IA disconnection with storage (BMP-Reduction<sub>lbs-P</sub>) is calculated using Equation 3-2. The BMP Load was calculated in example 3-5 and is 1.34 lbs/yr.

$$\text{BMP Reduction}_{\text{lbs-P}} = \text{BMP Load} \times (\text{BMP Reduction}_{\%-\text{P}}/100)$$

For PA of 0.09 acres HSG C the BMP Reduction<sub>lbs-P</sub> is calculated as follows:

$$\begin{aligned} \text{BMP Reduction}_{\text{lbs-P}(0.09\text{ac-HSG C})} &= 1.34 \text{ lbs/yr} \times (7/100) \\ &= \mathbf{0.09 \text{ lbs/yr}} \end{aligned}$$

Table Example 3-6-B presents the BMP Reduction<sub>lbs-P</sub> for each of the scenarios:

**Table Example 3-6-B: Reduction**

Pounds Phosphorus load reduction for IA disconnection, lbs/yr		
Receiving PA	Area of Receiving PA, acres	
	0.09	0.15
HSG C	0.09	0.19
HSG B (soil augmentation)	0.19	0.29

**Example 3-7: Determine the phosphorus load reduction for converting impervious area to permeable/pervious area.**

A municipality is planning upcoming road reconstruction work in medium density residential (MDR) neighborhoods and has identified an opportunity to convert impervious surfaces to permeable/pervious surfaces by narrowing the road width of 3.7 miles (mi) of roadway from 32 feet (ft) to 28 ft and eliminating 3.2 miles of 4 ft wide paved sidewalk (currently there are sidewalks on both sides of the roadways targeted for restoration). The newly created permeable/pervious area will be tilled and treated with soil amendments to support vegetated growth in order to restore hydrologic function to at least HSG B.

Determine the:

- A) Percent phosphorus load reduction rate (BMP Reduction %<sub>-P</sub>) for the conversion of impervious area (IA) to permeable/pervious area (PA); and
- B) Cumulative phosphorus reduction in pounds that would be accomplished by the project (BMP-Reduction lbs<sub>-P</sub>).

**Solution:**

1. Determine the area of IA to be converted to PA:  

$$\text{New PA} = (((3.7 \text{ mi} \times 4 \text{ ft}) + (3.2 \text{ mi} \times 4 \text{ ft})) \times 5280 \text{ ft/mi}) / 43,560 \text{ ft}^2/\text{acre}$$

$$= 3.35 \text{ acres}$$
2. Using Table 3-27, the phosphorus load reduction rate for converting IA to HSG B is 94.1%
3. The BMP Load is first determined using the method described above.  

$$\text{BMP Load} = \text{IA} \times \text{phosphorus export loading rate for MDR IA (see Table 3-1)}$$

$$= 3.35 \text{ acres} \times 1.96 \text{ lbs/acre/yr}$$

$$= 6.57 \text{ lbs/yr}$$
4. The cumulative phosphorus load reduction in pounds of phosphorus for the IA conversion (BMP-Reduction lbs<sub>-P</sub>) is calculated using Equation 3-2.  

$$\text{BMP Reduction lbs}_{-P} = \text{BMP Load} \times (\text{BMP Reduction \%}_{-P} / 100)$$

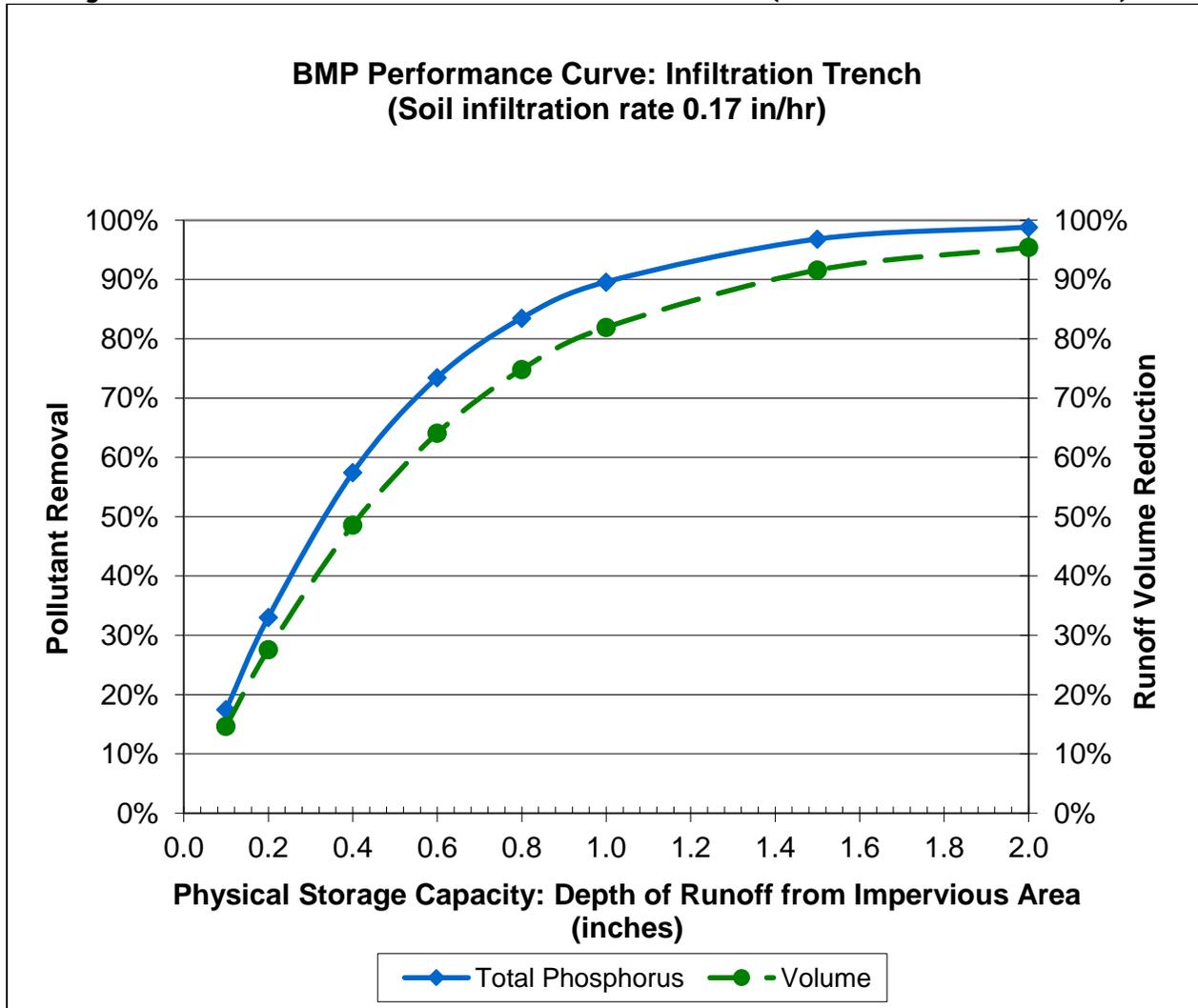
$$\text{BMP Reduction lbs}_{-P} = 6.57 \text{ lbs/yr} \times (94.1 / 100)$$

$$= 6.18 \text{ lbs/yr}$$

**Table 3- 4: Infiltration Trench (IR = 0.17 in/hr) BMP Performance Table**

Infiltration Trench (IR = 0.17 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	14.7%	27.6%	48.6%	64.1%	74.9%	82.0%	91.6%	95.4%
Cumulative Phosphorus Load Reduction	18%	33%	57%	73%	83%	90%	97%	99%

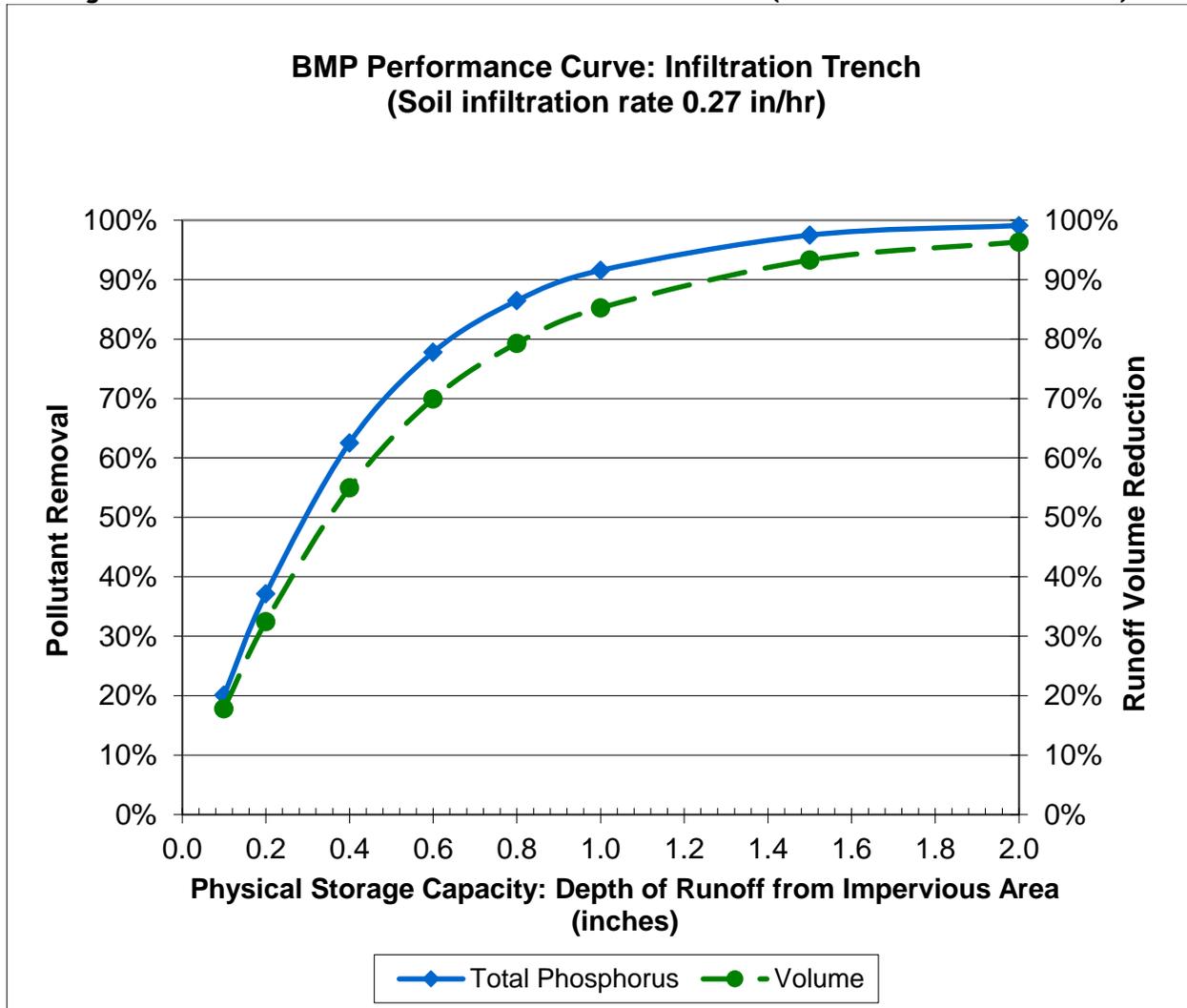
**Figure 3- 1: BMP Performance Curve: Infiltration Trench (infiltration rate = 0.17 in/hr)**



**Table 3- 5: Infiltration Trench (IR = 0.27 in/hr) BMP Performance Table**

Infiltration Trench (IR = 0.27 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	17.8%	32.5%	55.0%	70.0%	79.3%	85.2%	93.3%	96.3%
Cumulative Phosphorus Load Reduction	20%	37%	63%	78%	86%	92%	97%	99%

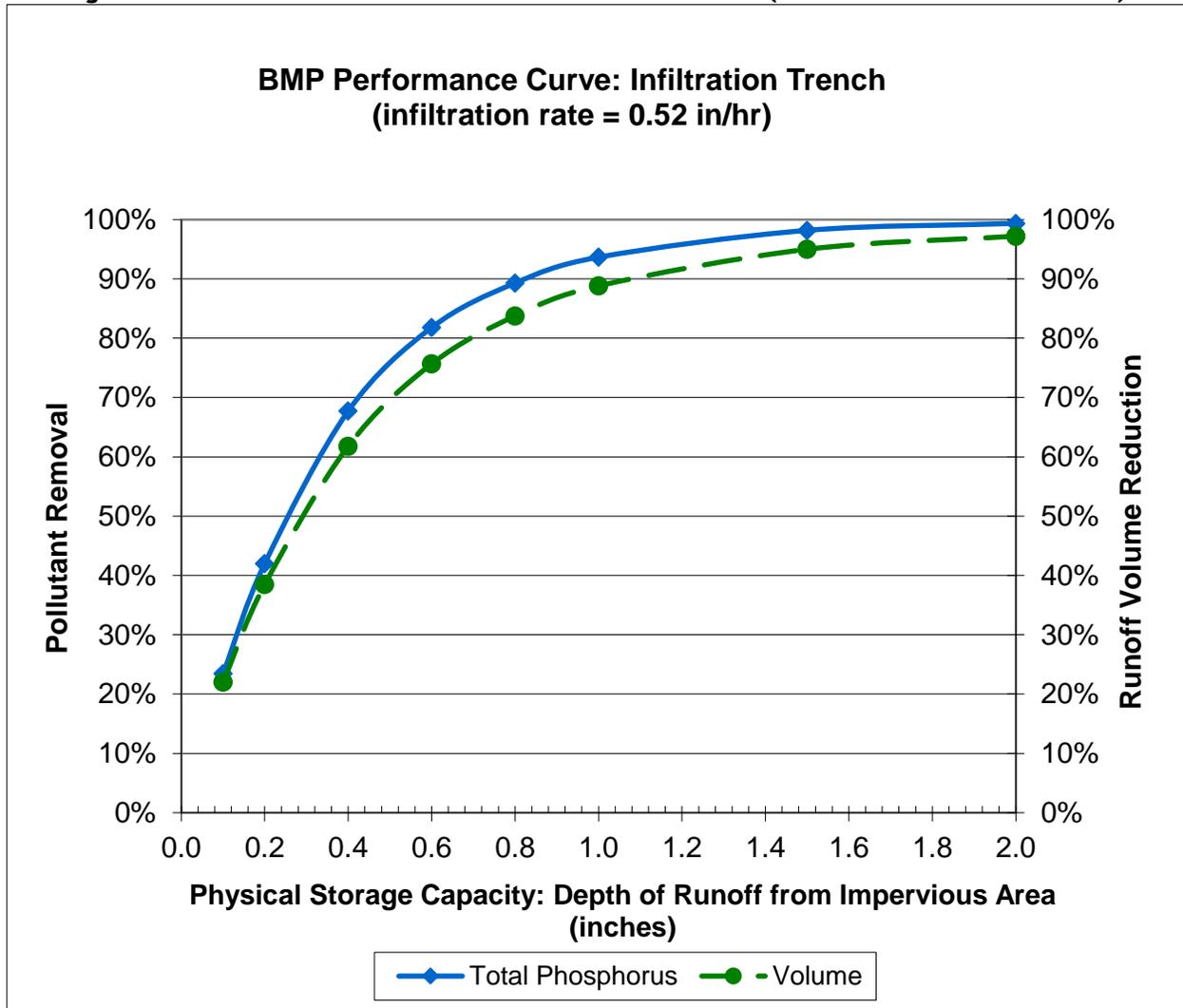
**Figure 3- 2: BMP Performance Curve: Infiltration Trench (infiltration rate = 0.27 in/hr)**



**Table 3- 6: Infiltration Trench (IR = 0.52 in/hr) BMP Performance Table**

Infiltration Trench (IR = 0.52 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	22.0%	38.5%	61.8%	75.7%	83.7%	88.8%	95.0%	97.2%
Cumulative Phosphorus Load Reduction	23%	42%	68%	82%	89%	94%	98%	99%

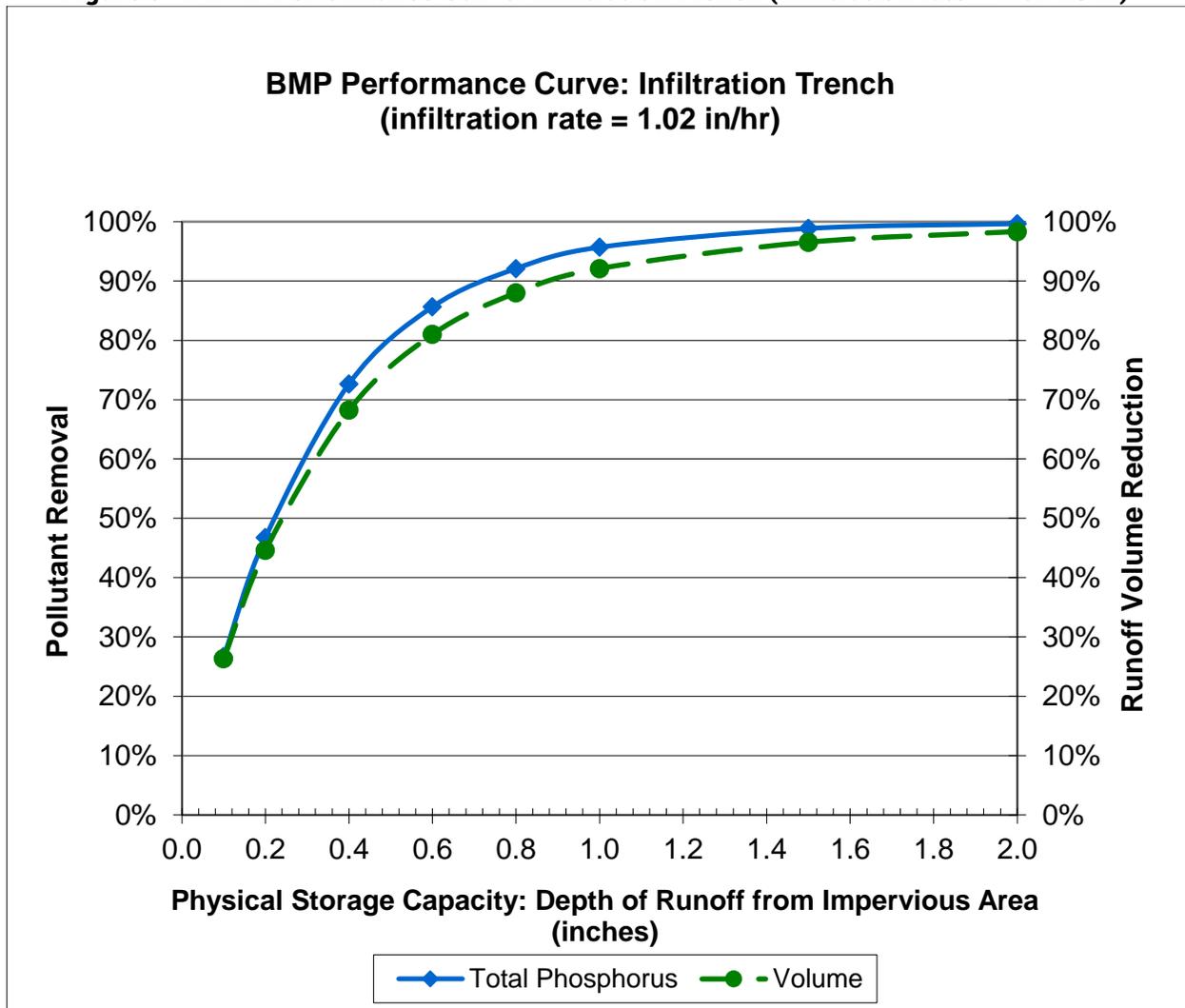
**Figure 3- 3: BMP Performance Curve: Infiltration Trench (infiltration rate = 0.52 in/hr)**



**Table 3- 7: Infiltration Trench (IR = 1.02 in/hr) BMP Performance Table**

Infiltration Trench (IR = 1.02 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	26.3%	44.6%	68.2%	81.0%	88.0%	92.1%	96.5%	98.3%
Cumulative Phosphorus Load Reduction	27%	47%	73%	86%	92%	96%	99%	100%

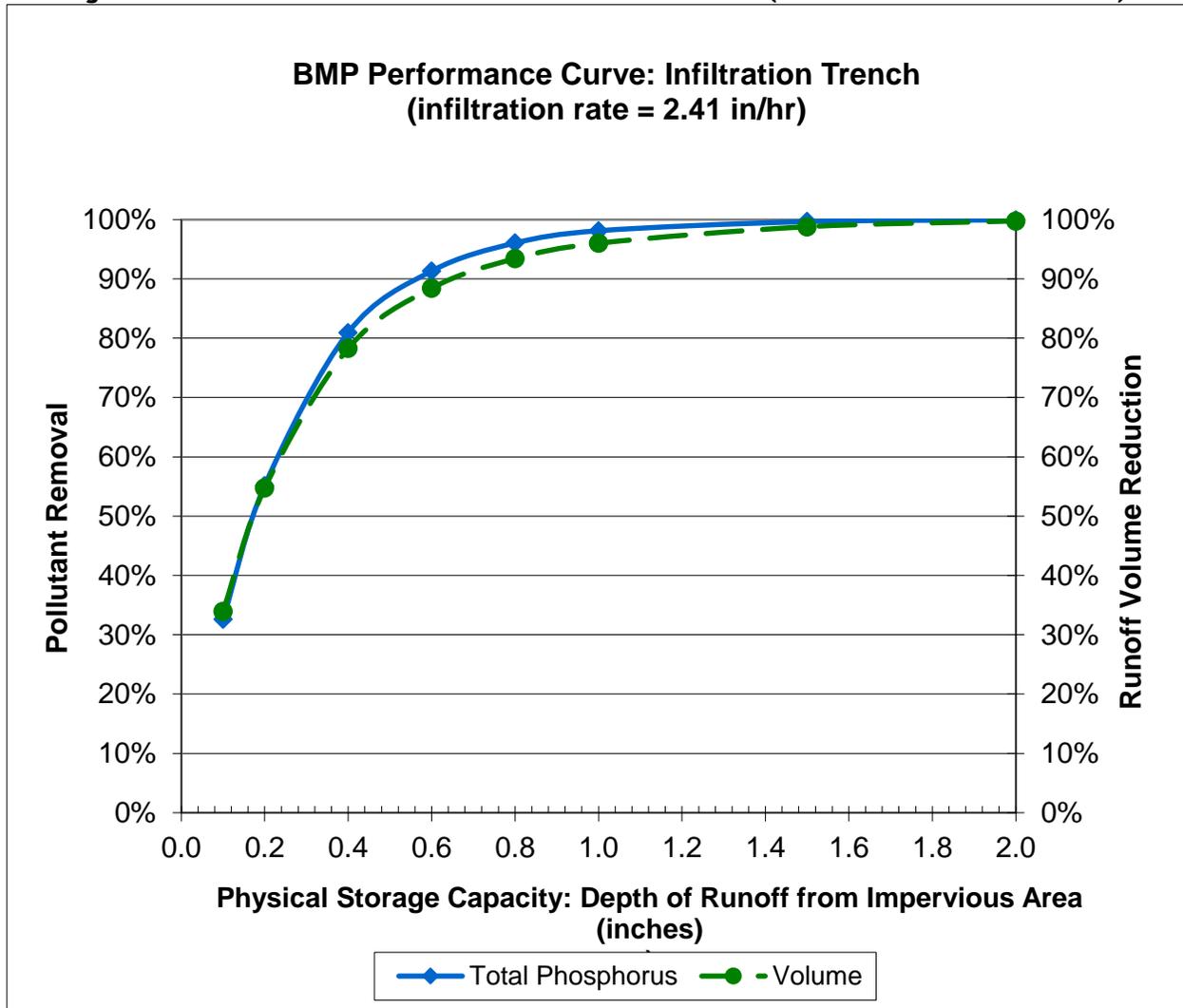
**Figure 3- 4: BMP Performance Curve: Infiltration Trench (infiltration rate = 1.02 in/hr)**



**Table 3- 8: Infiltration Trench (IR = 2.41 in/hr) BMP Performance Table**

Infiltration Trench (IR = 2.41 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	34.0%	54.7%	78.3%	88.4%	93.4%	96.0%	98.8%	99.8%
Cumulative Phosphorus Load Reduction	33%	55%	81%	91%	96%	98%	100%	100%

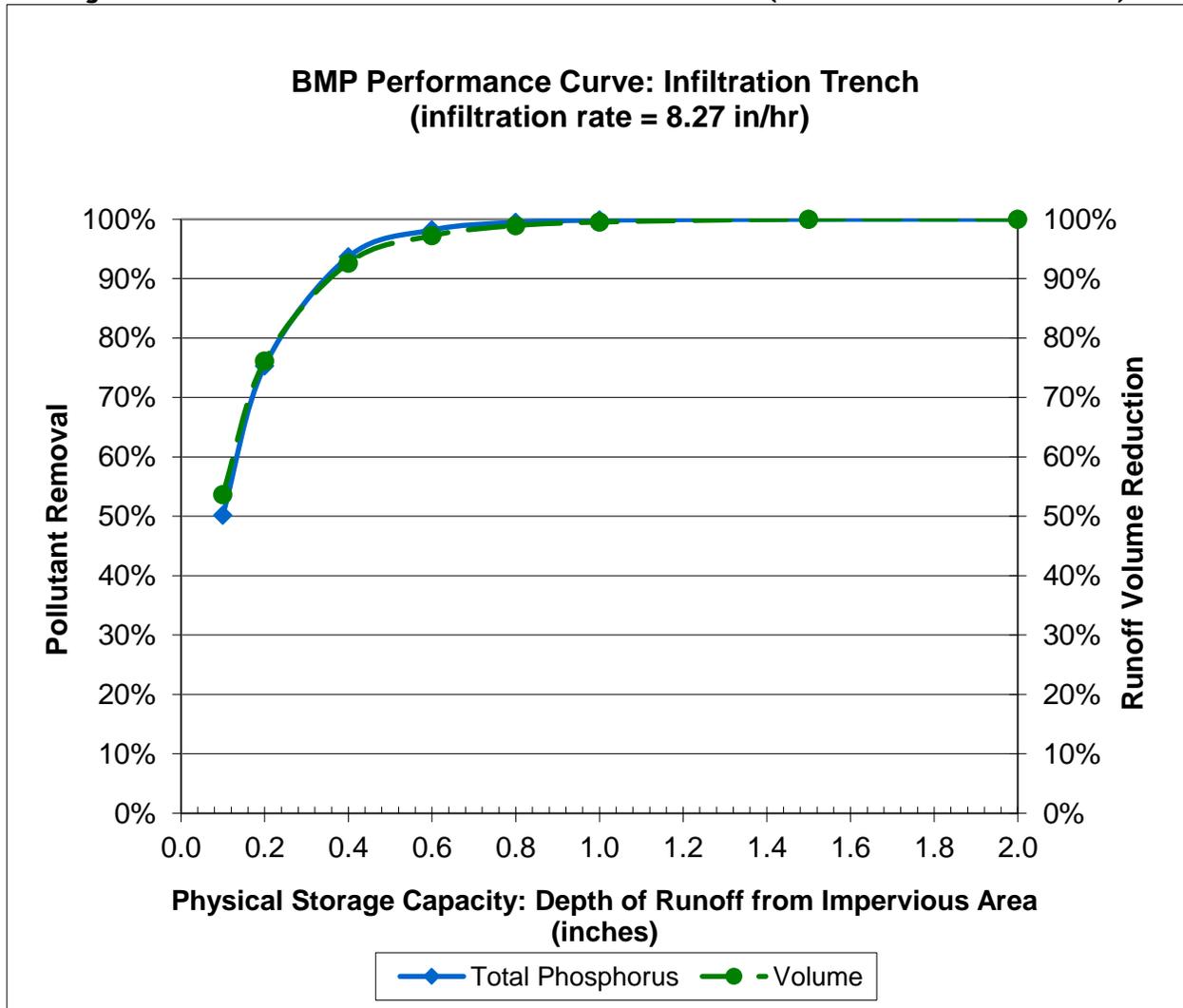
**Figure 3- 5: BMP Performance Curve: Infiltration Trench (infiltration rate = 2.41 in/hr)**



**Table 3- 9: Infiltration Trench (8.27 in/hr) BMP Performance Table**

Infiltration Trench (8.27 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	53.6%	76.1%	92.6%	97.2%	98.9%	99.5%	100.0%	100.0%
Cumulative Phosphorus Load Reduction	50%	75%	94%	98%	99%	100%	100%	100%

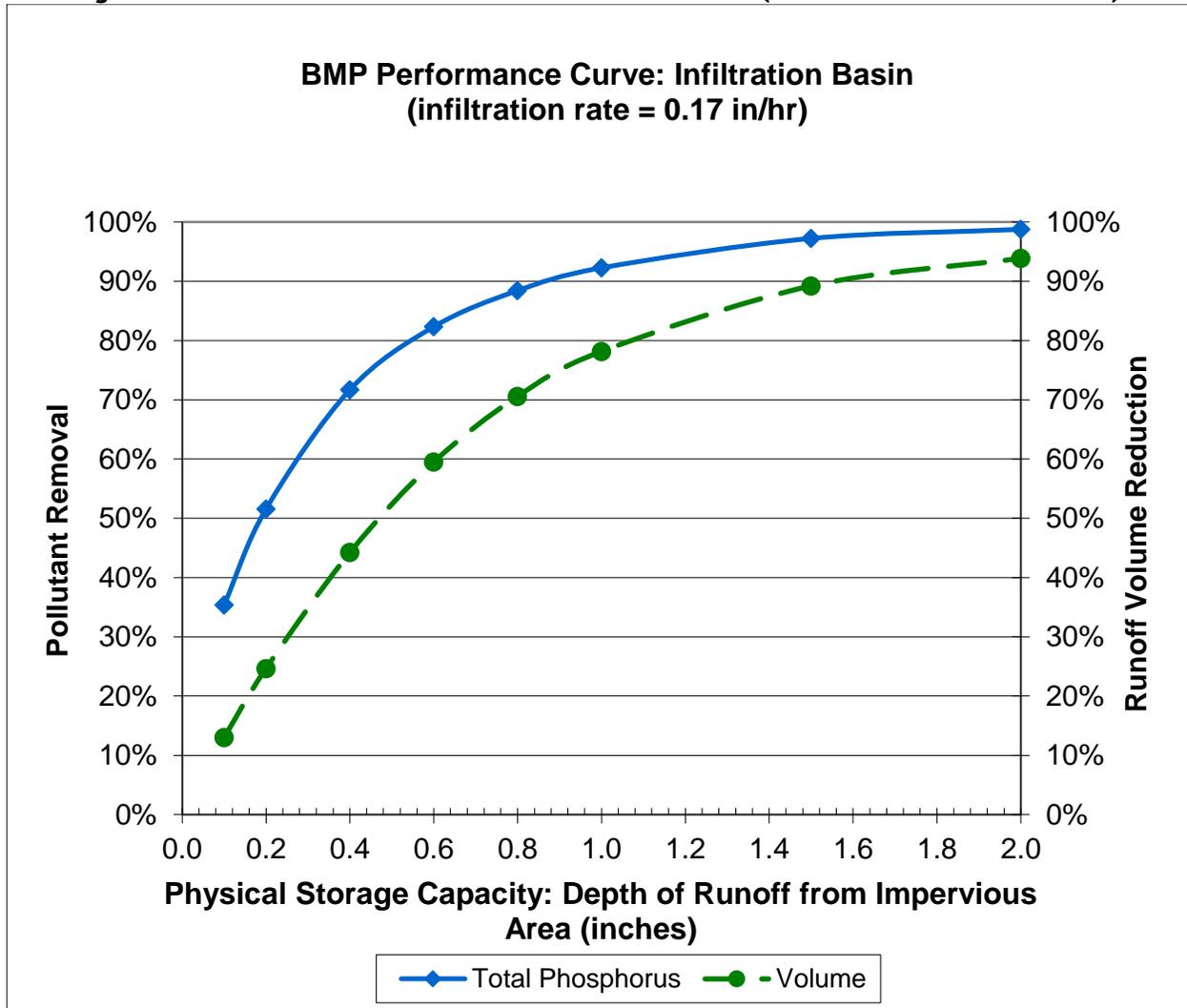
**Figure 3- 6: BMP Performance Curve: Infiltration Trench (infiltration rate = 8.27 in/hr)**



**Table 3- 10: Infiltration Basin (0.17 in/hr) BMP Performance Table**

Infiltration Basin (0.17 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	13.0%	24.6%	44.2%	59.5%	70.6%	78.1%	89.2%	93.9%
Cumulative Phosphorus Load Reduction	35%	52%	72%	82%	88%	92%	97%	99%

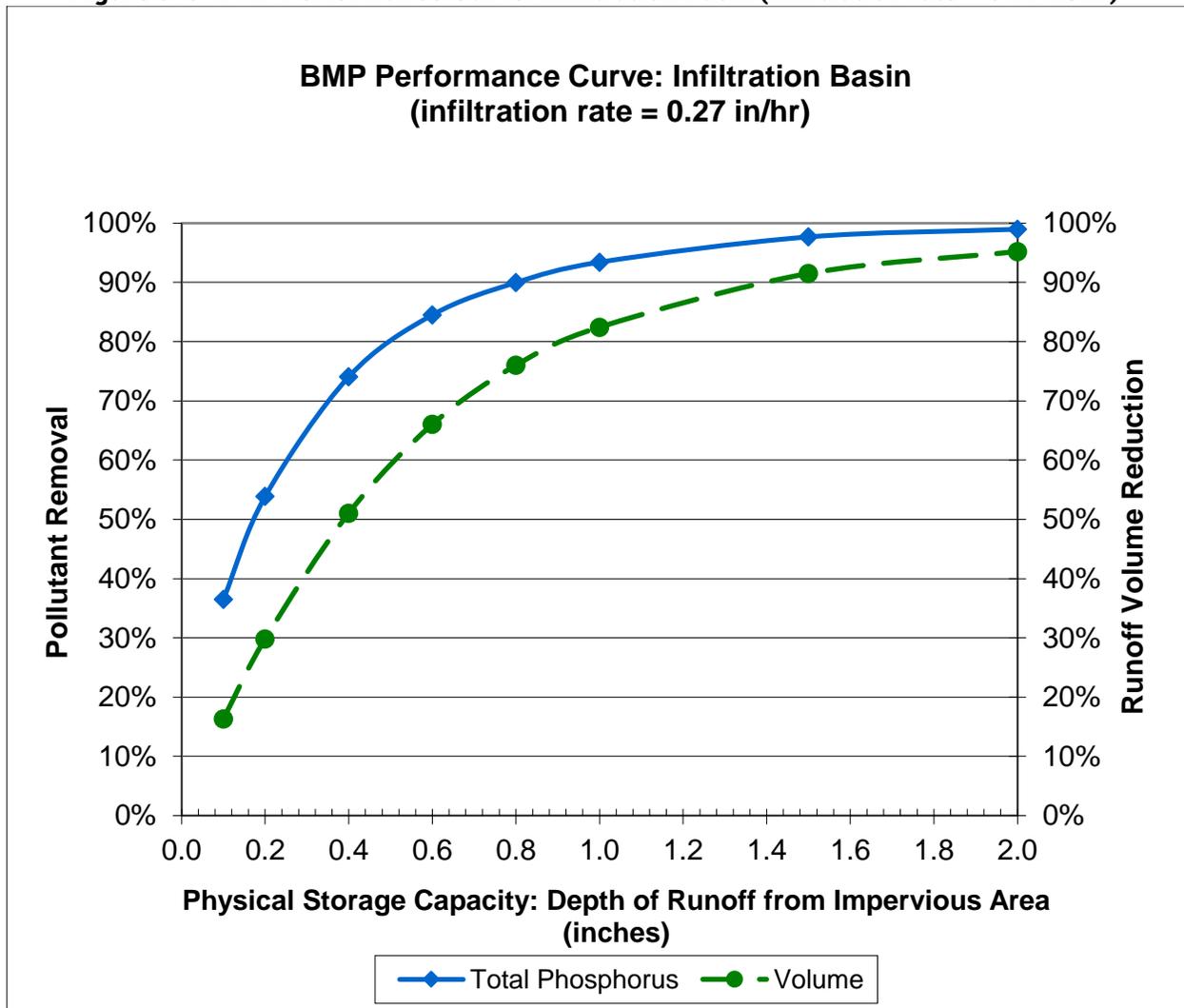
**Figure 3- 7: BMP Performance Curve: Infiltration Basin (infiltration rate = 0.17 in/hr)**



**Table 3- 11: Infiltration Basin (0.27 in/hr) BMP Performance Table**

Infiltration Basin (0.27 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	16.3%	29.8%	51.0%	66.0%	76.0%	82.4%	91.5%	95.2%
Cumulative Phosphorus Load Reduction	37%	54%	74 %	85%	90%	93%	98%	99%

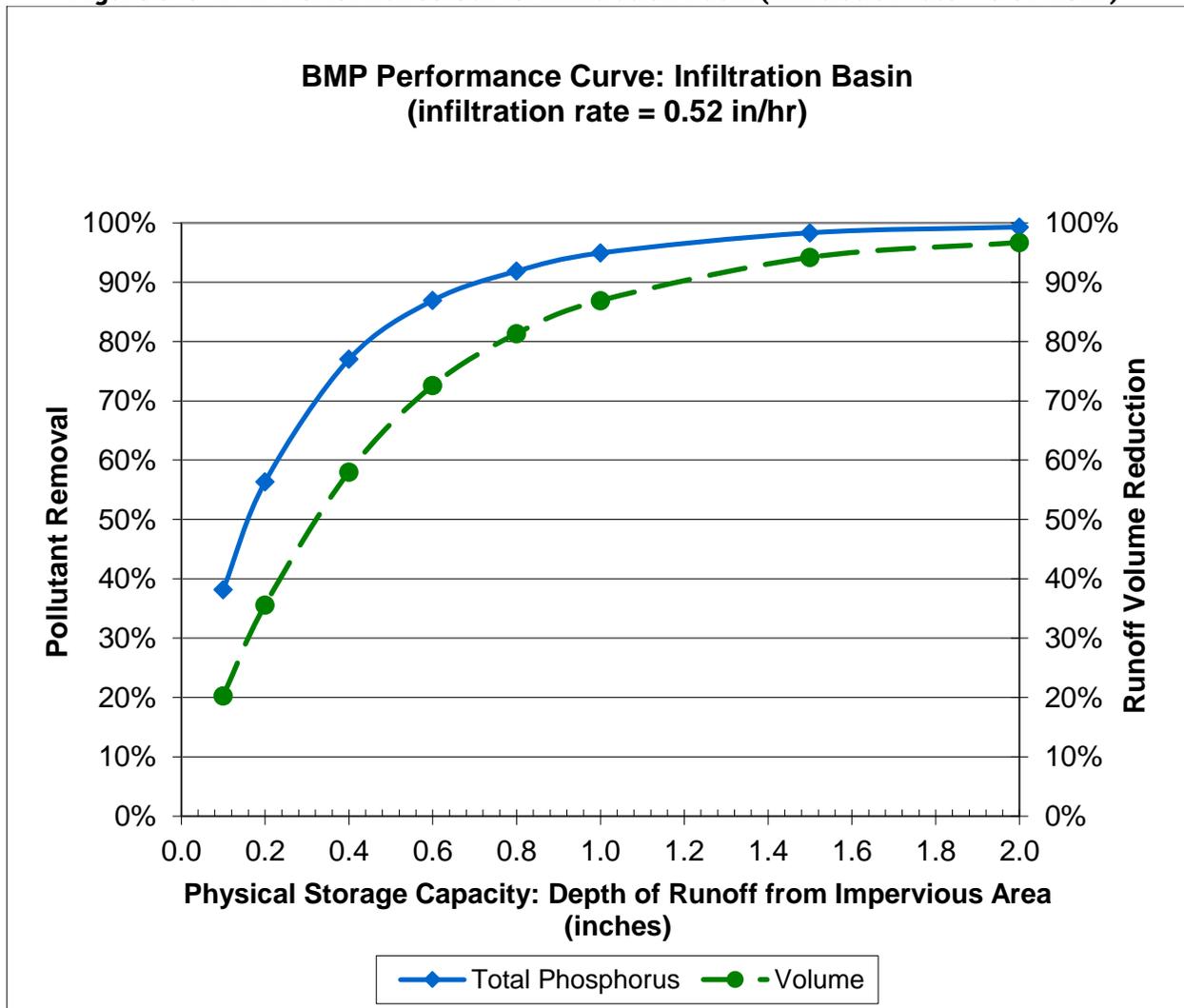
**Figure 3- 8: BMP Performance Curve: Infiltration Basin (infiltration rate = 0.27 in/hr)**



**Table 3- 12: Infiltration Basin (0.52 in/hr) BMP Performance Table**

Infiltration Basin (0.52 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	20.2%	35.6%	58.0%	72.6%	81.3%	86.9%	94.2%	96.7%
Cumulative Phosphorus Load Reduction	38%	56%	77%	87%	92%	95%	98%	99%

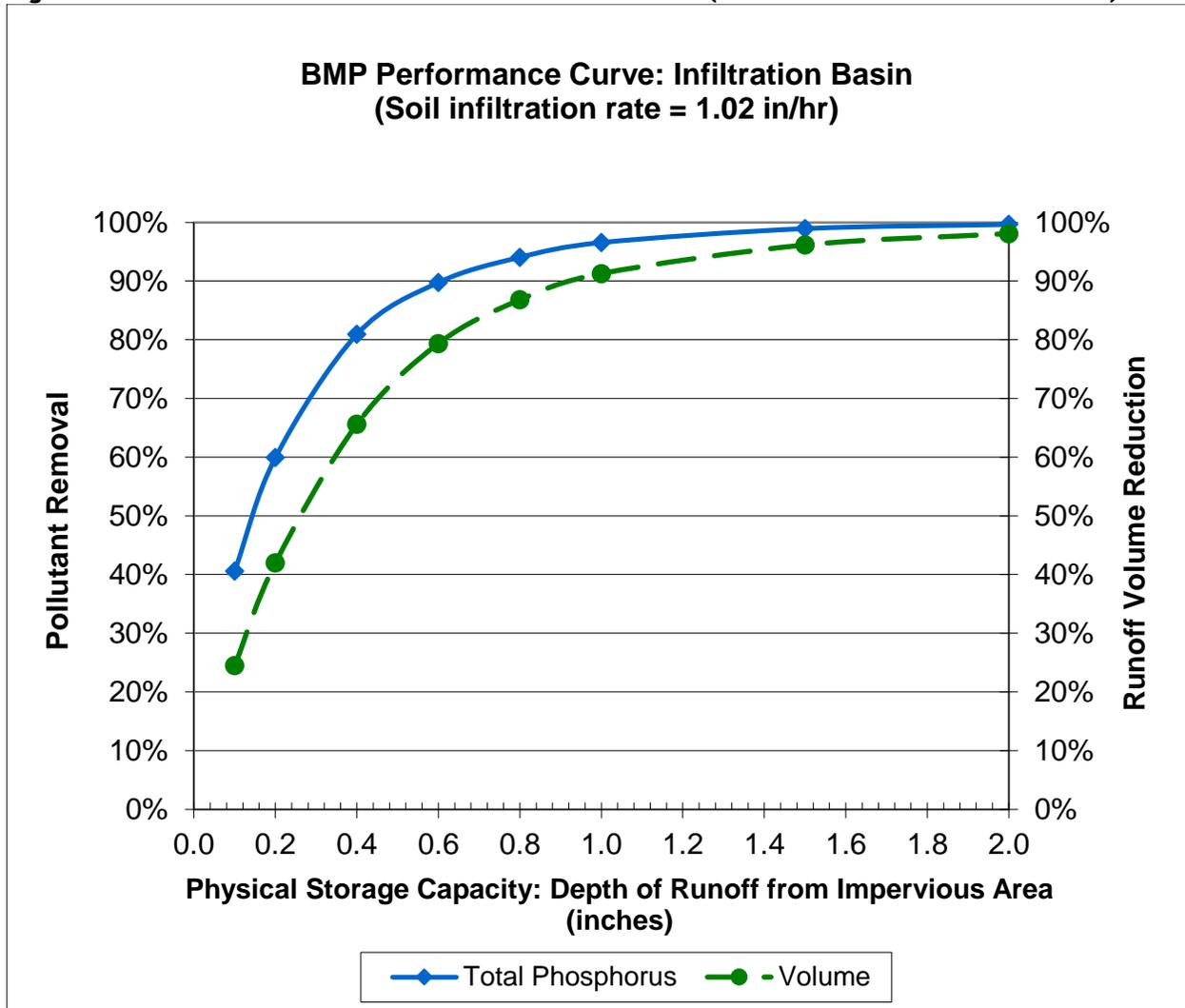
**Figure 3- 9: BMP Performance Curve: Infiltration Basin (infiltration rate = 0.52 in/hr)**



**Table 3- 13: Infiltration Basin (1.02 in/hr) BMP Performance Table**

Infiltration Basin (1.02 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	24.5%	42.0%	65.6%	79.4%	86.8%	91.3%	96.2%	98.1%
Cumulative Phosphorus Load Reduction	41%	60%	81%	90%	94%	97%	99%	100%

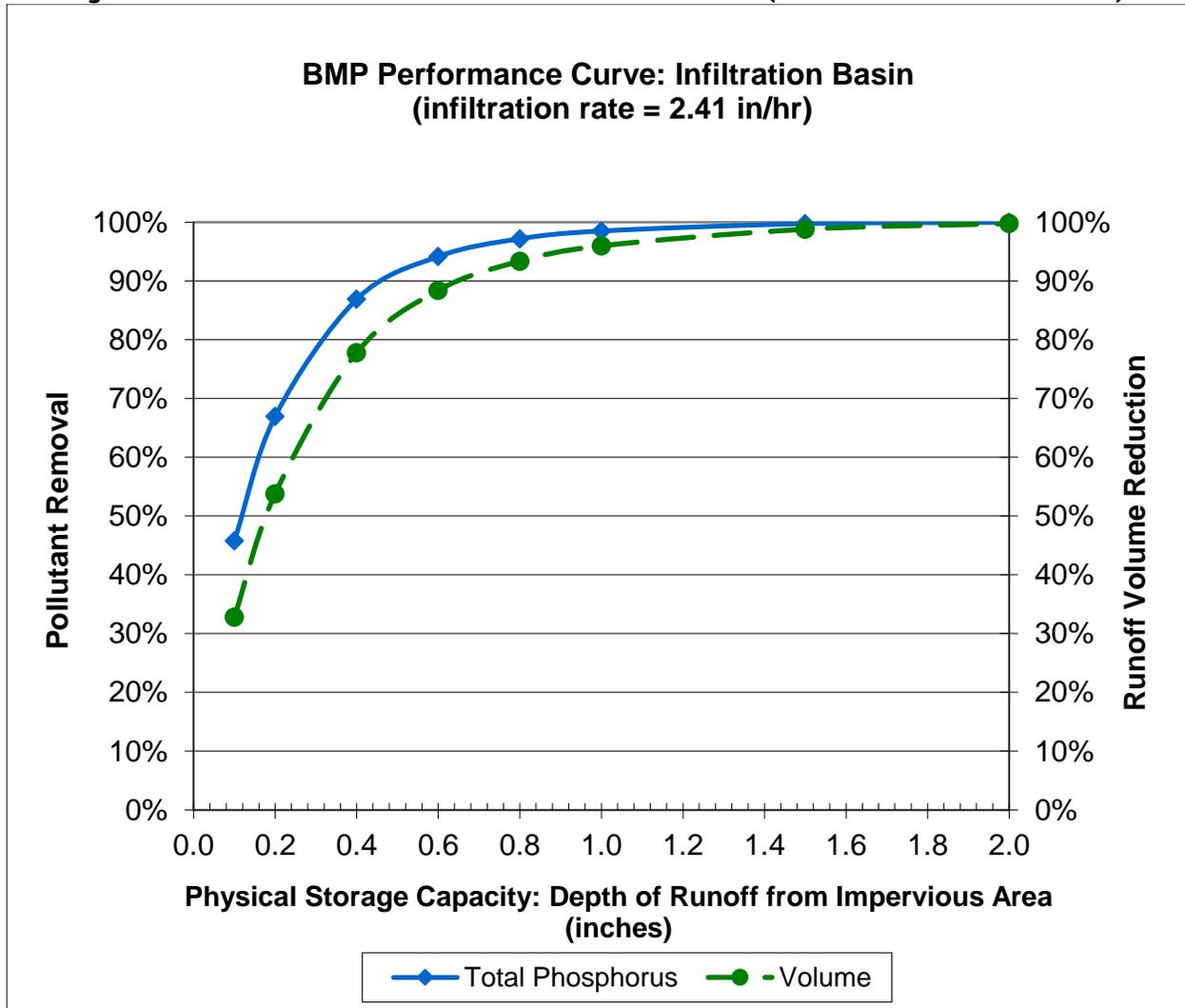
**Figure 3- 10: BMP Performance Curve: Infiltration Basin (Soil infiltration rate = 1.02 in/hr)**



**Table 3- 14: Infiltration Basin (2.41 in/hr) BMP Performance Table**

Infiltration Basin (2.41 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	32.8%	53.8%	77.8%	88.4%	93.4%	96.0%	98.8%	99.8%
Cumulative Phosphorus Load Reduction	46%	67%	87%	94%	97%	98%	100%	100%

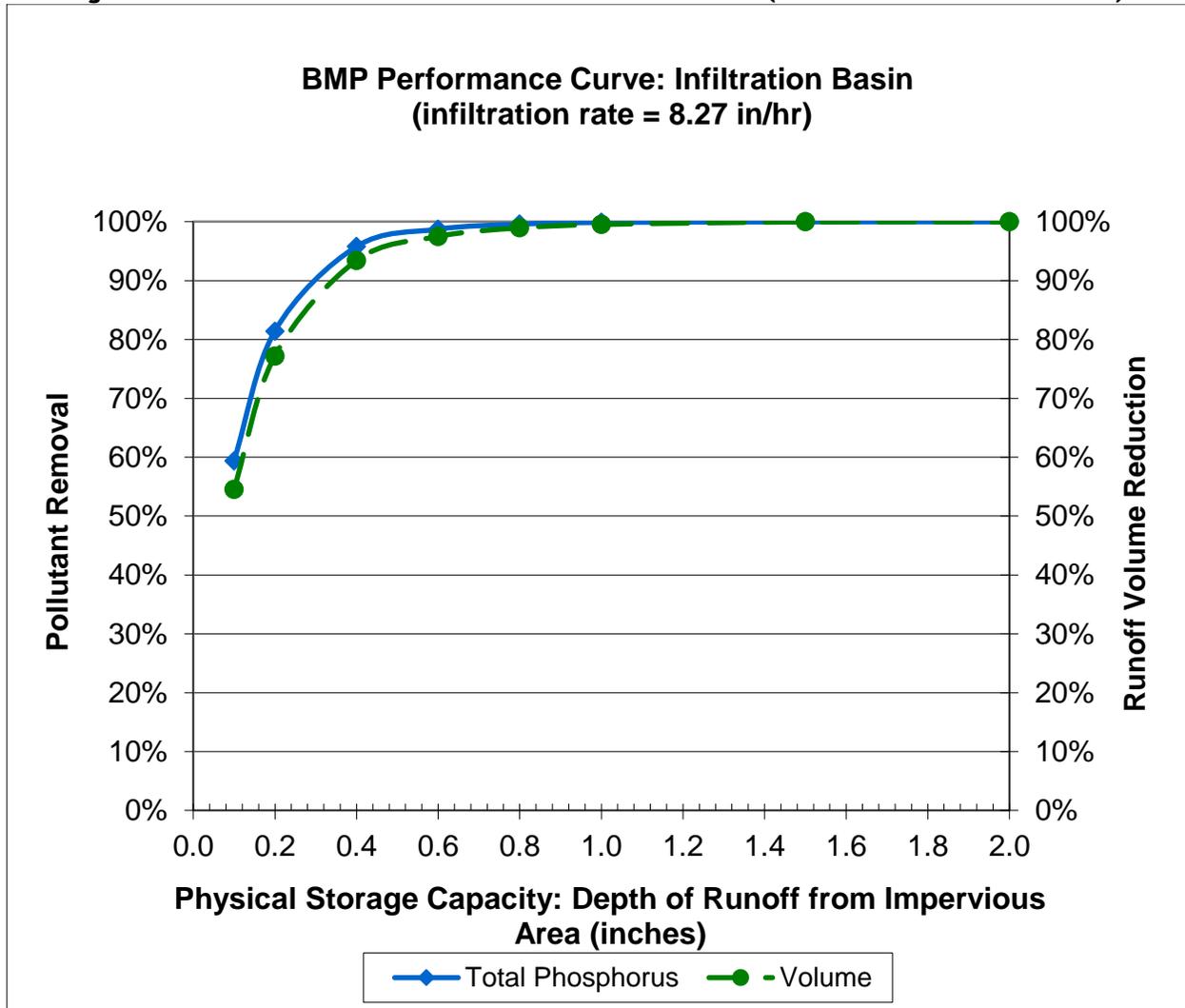
**Figure 3- 11: BMP Performance Curve: Infiltration Basin (infiltration rate = 2.41 in/hr)**



**Table 3- 15: Infiltration Basin (8.27 in/hr) BMP Performance Table**

Infiltration Basin (8.27 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	54.6%	77.2%	93.4%	97.5%	99.0%	99.6%	100.0%	100.0%
Cumulative Phosphorus Load Reduction	59%	81%	96%	99%	100%	100%	100%	100%

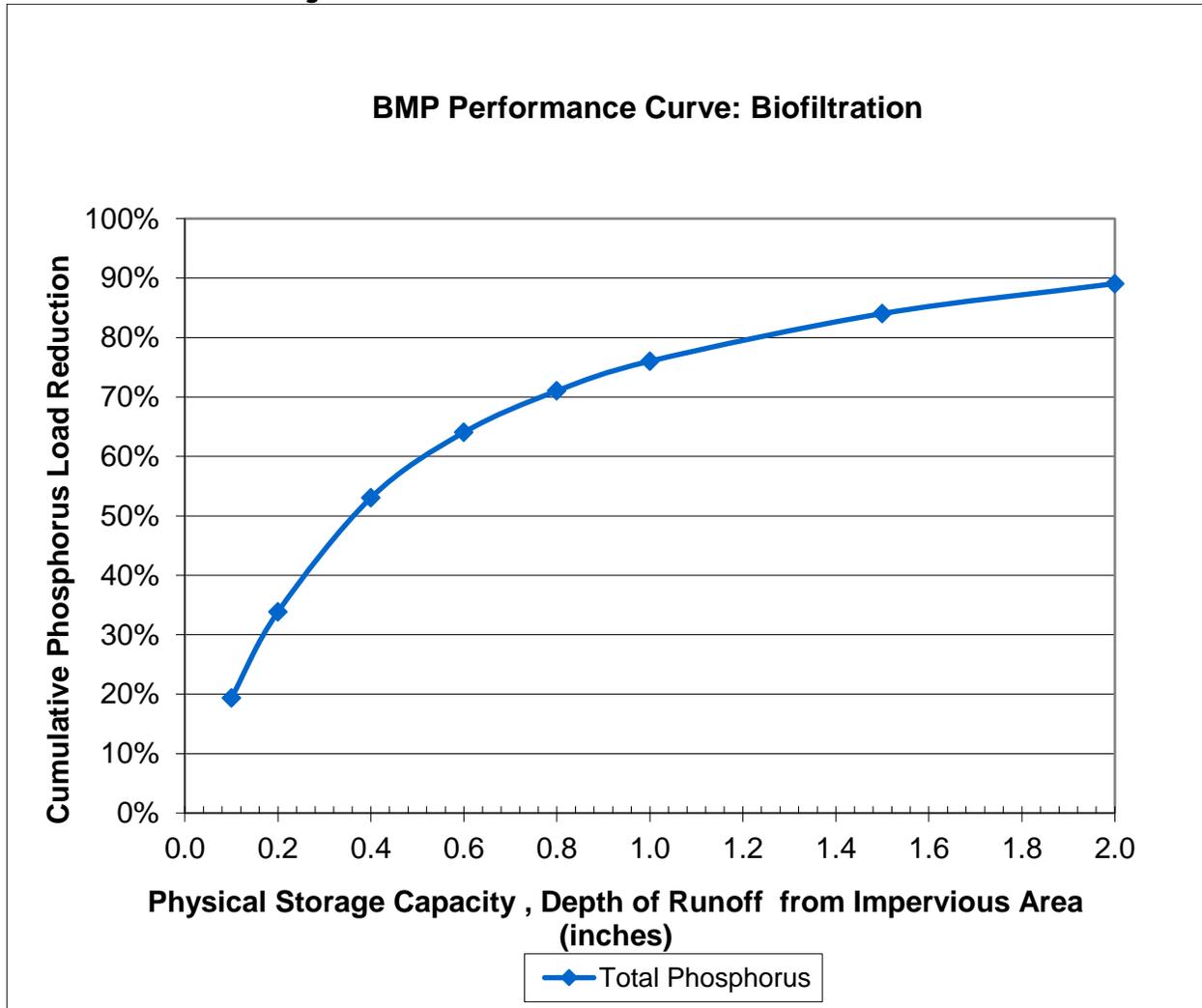
**Figure 3- 12: BMP Performance Curve: Infiltration Basin (infiltration rate = 8.27 in/hr)**



**Table 3- 16: Biofiltration BMP Performance Table**

Biofiltration BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Cumulative Phosphorus Load Reduction	19%	34%	53%	64%	71%	76%	84%	89%

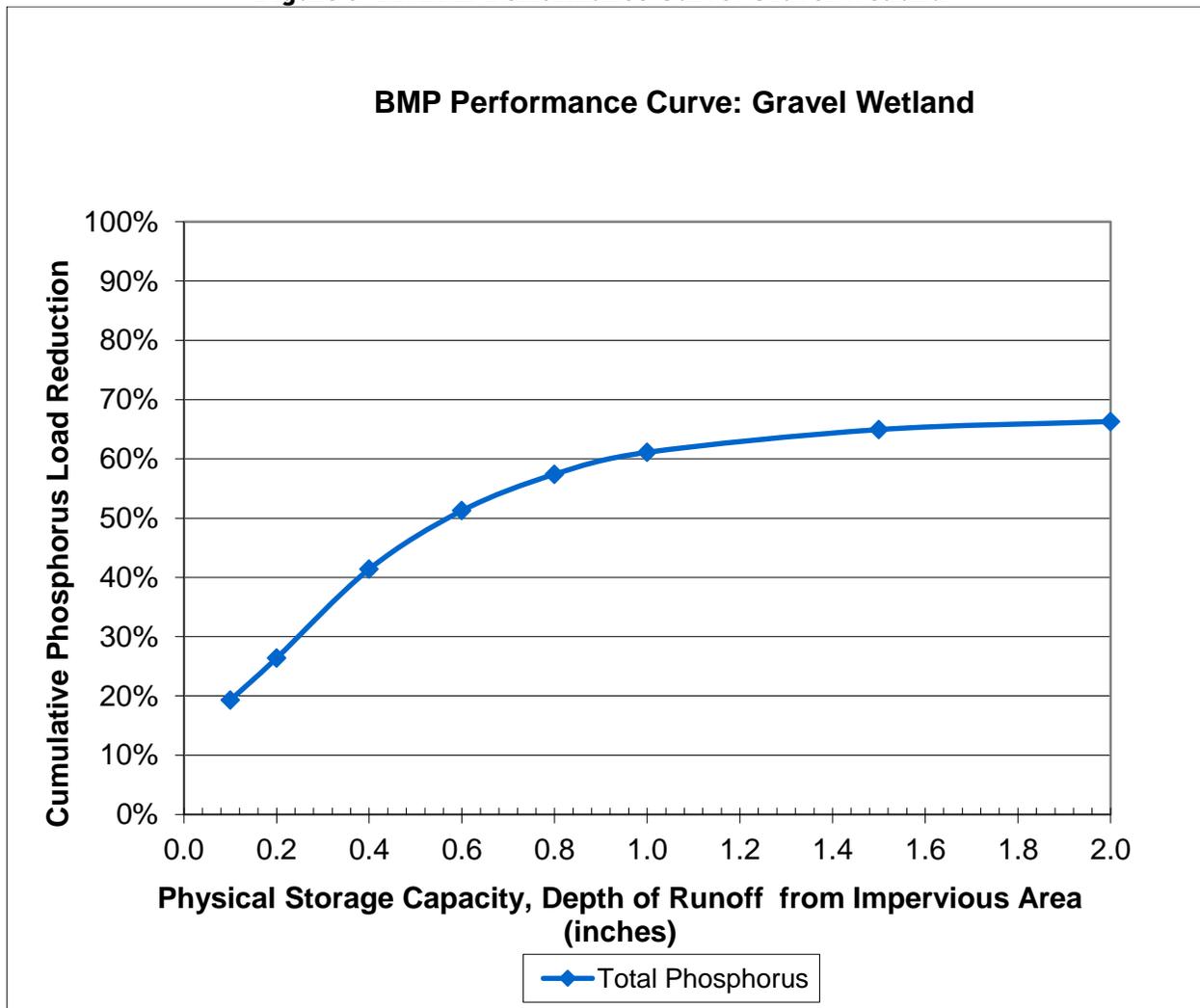
**Figure 3- 13: BMP Performance Curve: Biofiltration**



**Table 3- 17: Gravel Wetland BMP Performance Table**

Gravel Wetland BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Cumulative Phosphorus Load Reduction	19%	26%	41%	51%	57%	61%	65%	66%

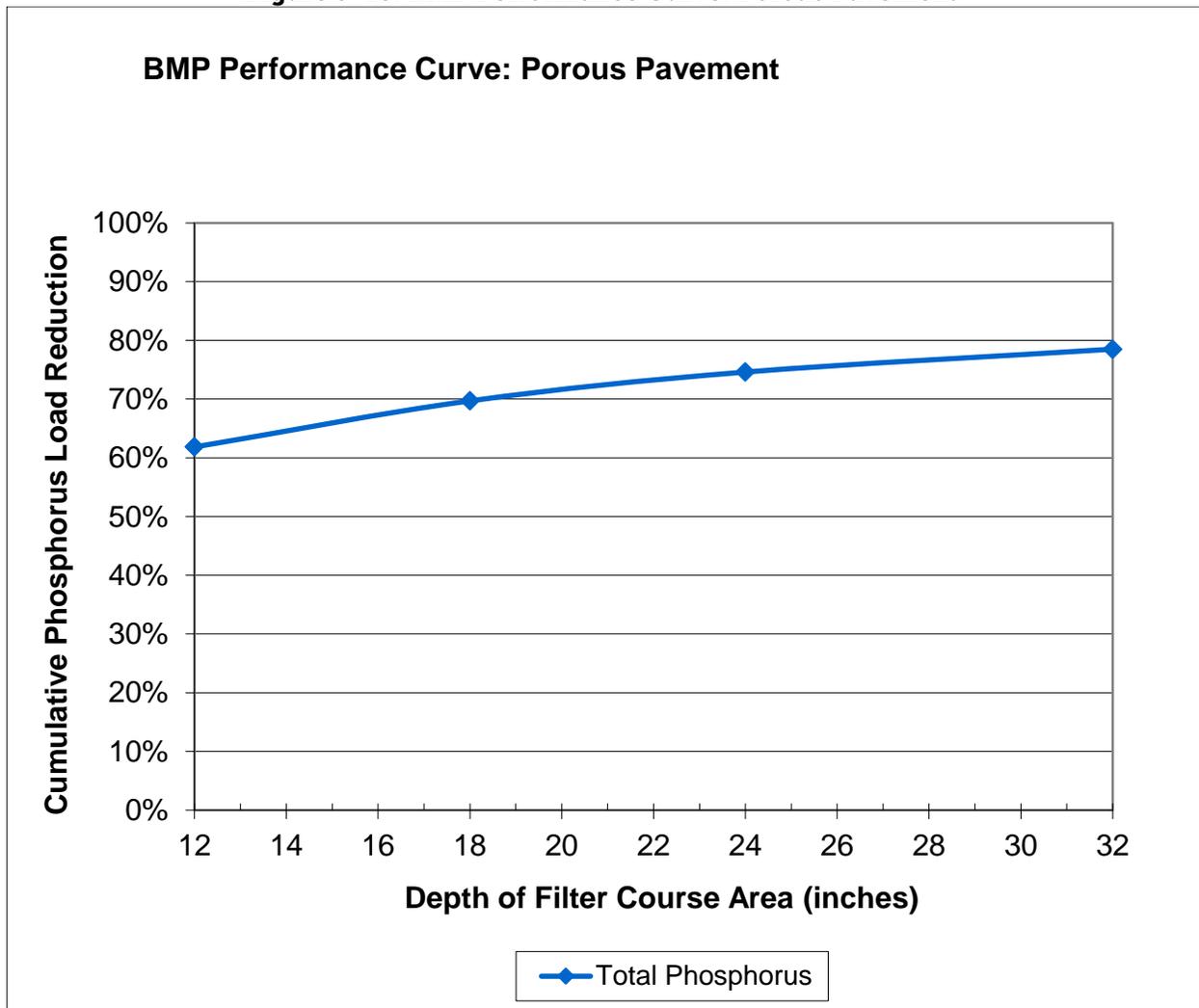
**Figure 3- 14: BMP Performance Curve: Gravel Wetland**



**Table 3- 18: Porous Pavement BMP Performance Table**

Porous Pavement BMP Performance Table: Long-Term Phosphorus Load Reduction				
<b>BMP Capacity: Depth of Filter Course Area (inches)</b>	12.0	18.0	24.0	32.0
<b>Cumulative Phosphorus Load Reduction</b>	62%	70%	75%	78%

**Figure 3- 15: BMP Performance Curve: Porous Pavement**



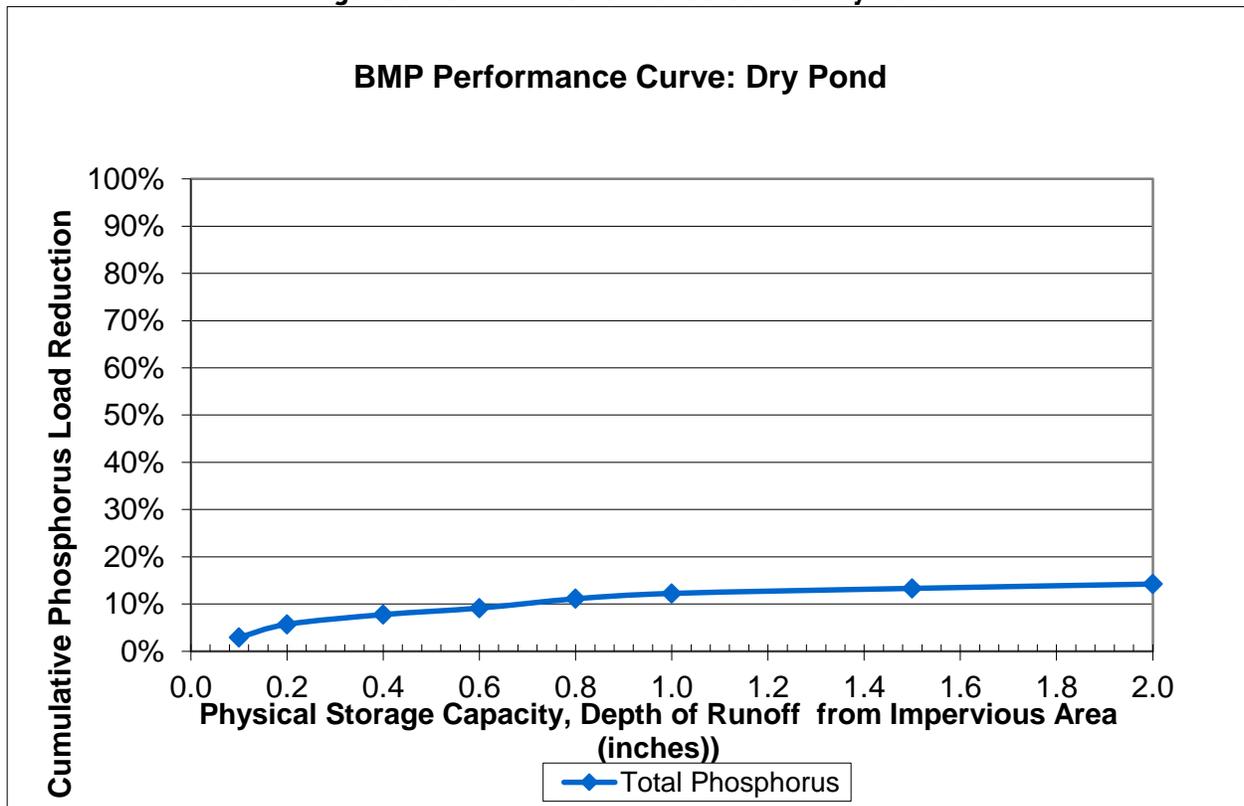
**Table 3- 19: Wet Pond BMP Performance Table**

Wet Pond BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Cumulative Phosphorus Load Reduction	14%	25%	37%	44%	48%	53%	58%	63%

**Table 3- 20: Dry Pond BMP Performance Table**

Dry Pond BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Cumulative Phosphorus Load Reduction	3%	6%	8%	9%	11%	12%	13%	14%

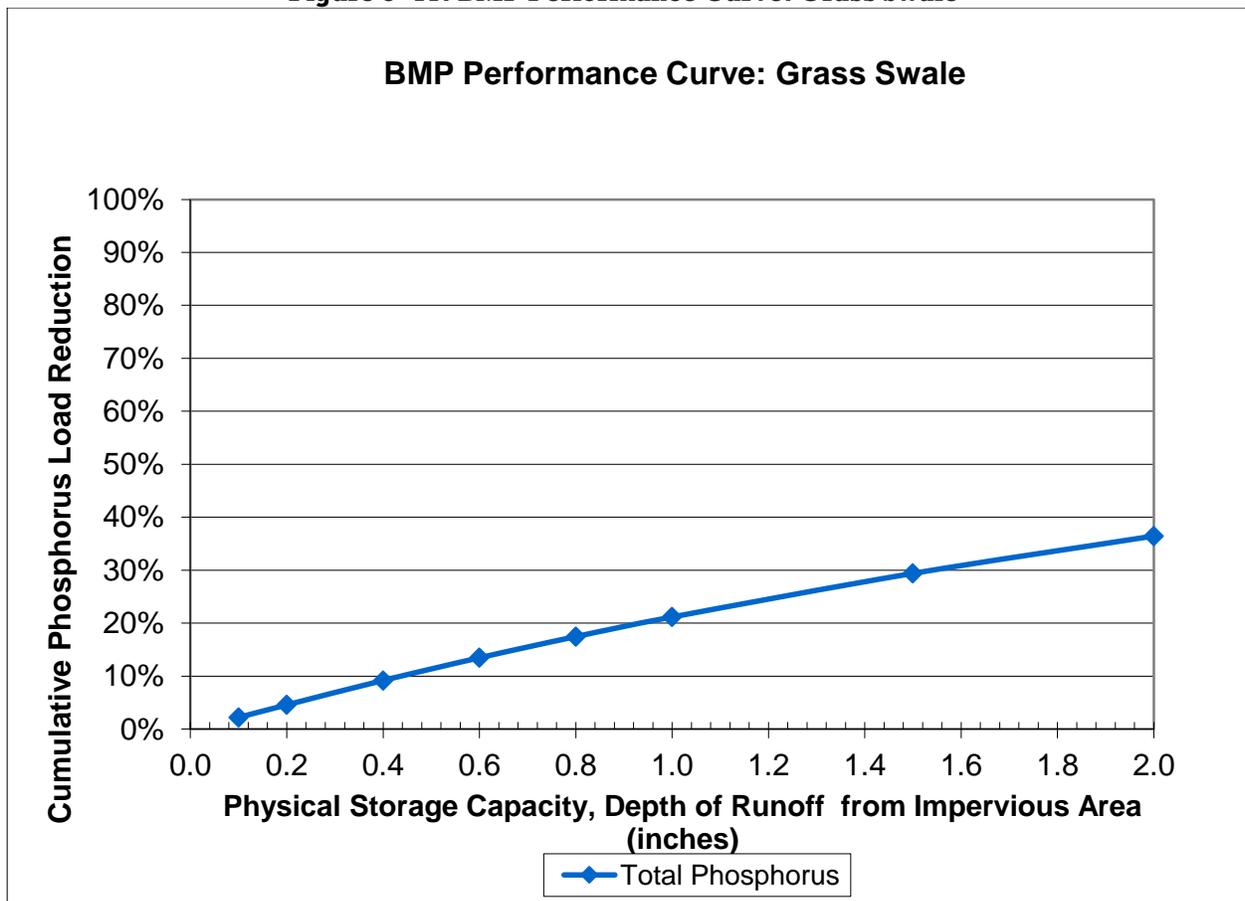
**Figure 3- 16: BMP Performance Curve: Dry Pond**



**Table 3- 21: Grass Swale BMP Performance Table**

Grass Swale BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Cumulative Phosphorus Load Reduction	2%	5%	9%	13%	17%	21%	29%	36%

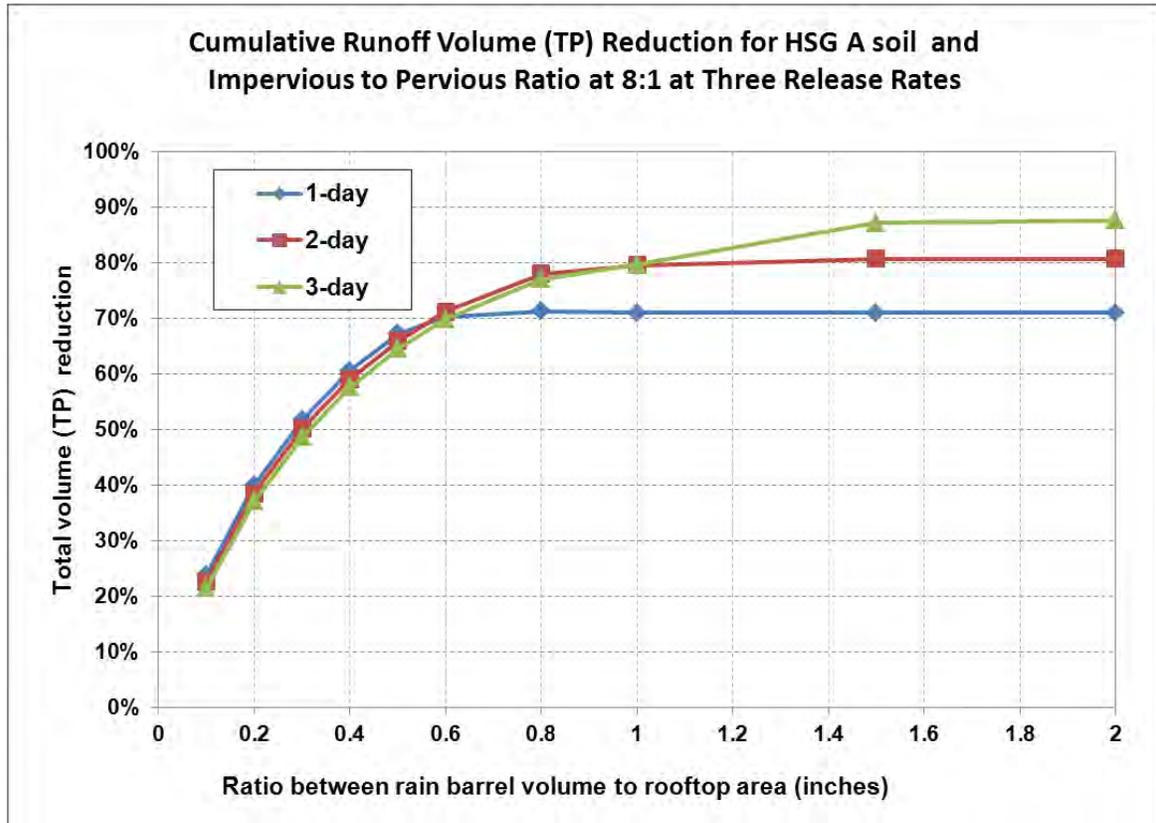
**Figure 3- 17: BMP Performance Curve: Grass Swale**



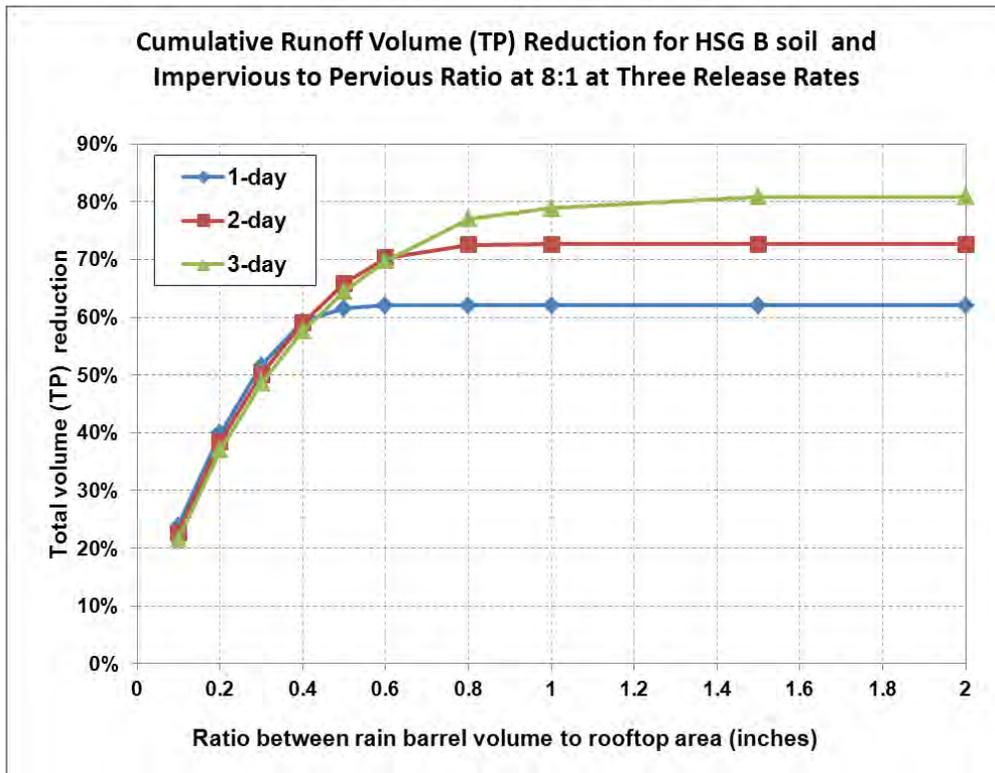
**Table 3- 22: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1**

Impervious Area Disconnection through Storage : Impervious Area to Pervious Area Ratio = 8:1												
Storage volume to impervious area ratio	Total Runoff Volume (TP) Reduction Percentages											
	HSG A			HSG B			HSG C			HSG D		
	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day
0.1 in	24%	23%	22%	24%	23%	22%	24%	23%	22%	22%	22%	21%
0.2 in	40%	38%	37%	40%	38%	37%	37%	38%	37%	24%	26%	27%
0.3 in	52%	50%	49%	52%	50%	49%	40%	46%	49%	24%	26%	27%
0.4 in	61%	59%	58%	59%	59%	58%	40%	48%	54%	24%	26%	27%
0.5 in	67%	66%	64%	62%	66%	64%	40%	48%	56%	24%	26%	27%
0.6 in	70%	71%	70%	62%	70%	70%	40%	48%	56%	24%	26%	27%
0.8 in	71%	78%	77%	62%	73%	77%	40%	48%	56%	24%	26%	27%
1.0 in	71%	80%	80%	62%	73%	79%	40%	48%	56%	24%	26%	27%
1.5 in	71%	81%	87%	62%	73%	81%	40%	48%	56%	24%	26%	27%
2.0 in	71%	81%	88%	62%	73%	81%	40%	48%	56%	24%	26%	27%

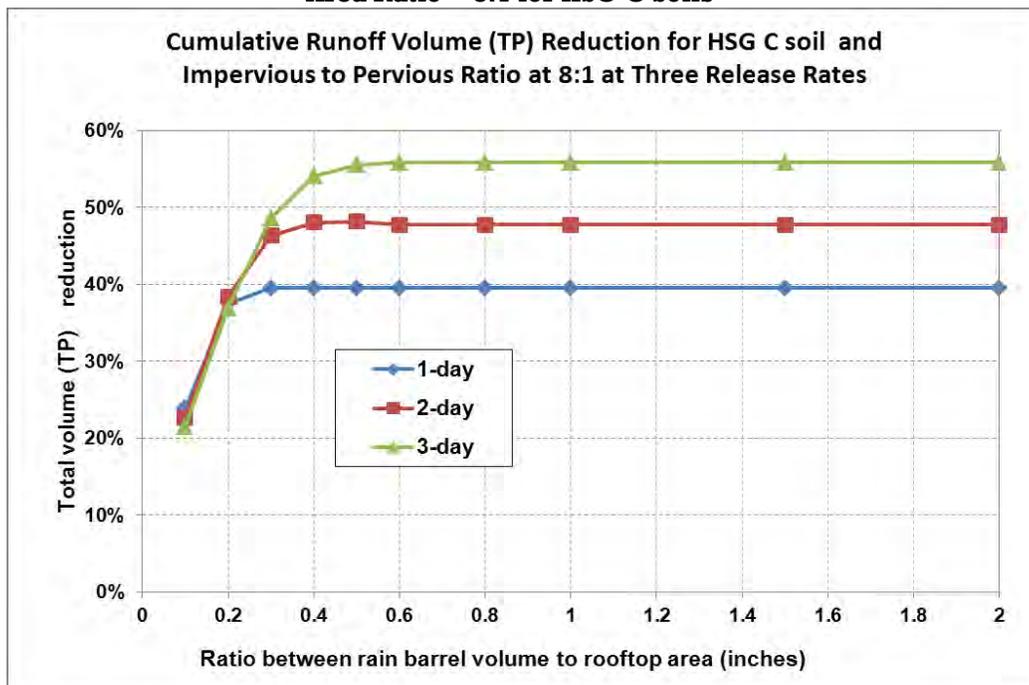
**Figure 3- 18: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1 for HSG A Soils**



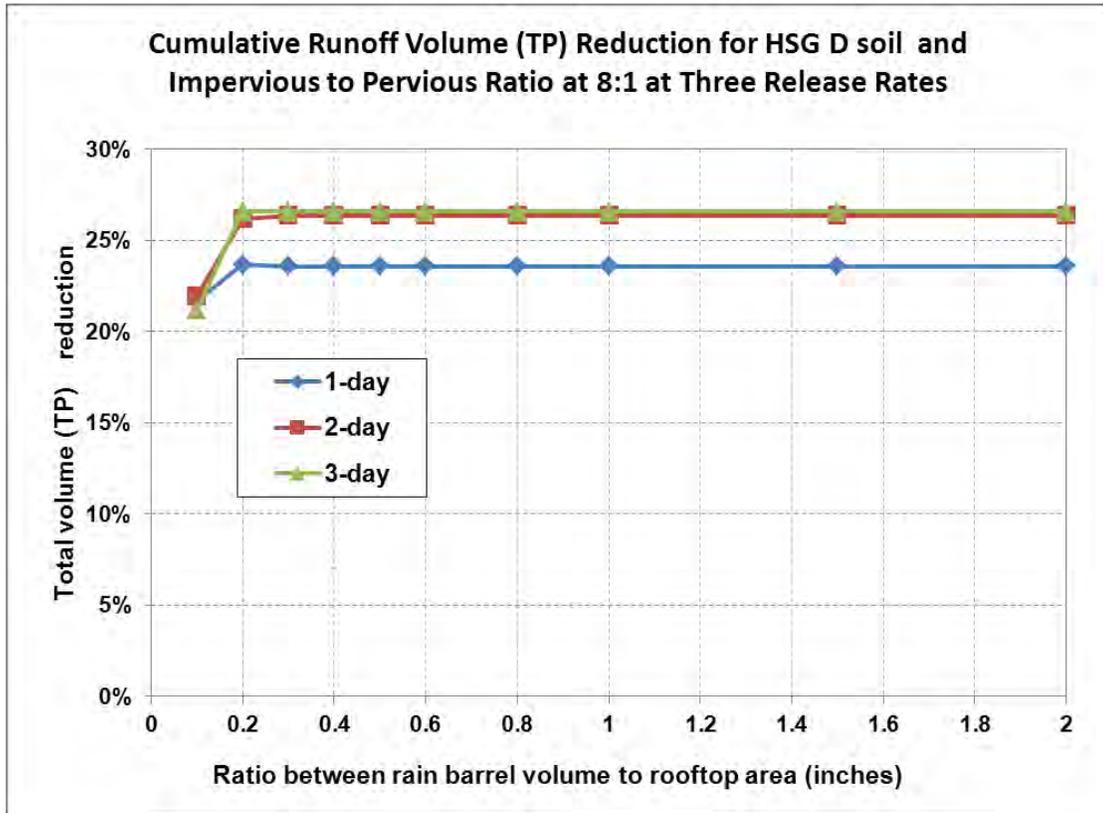
**Figure 3- 19: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1 for HSG B Soils**



**Figure 3- 20: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1 for HSG C Soils**



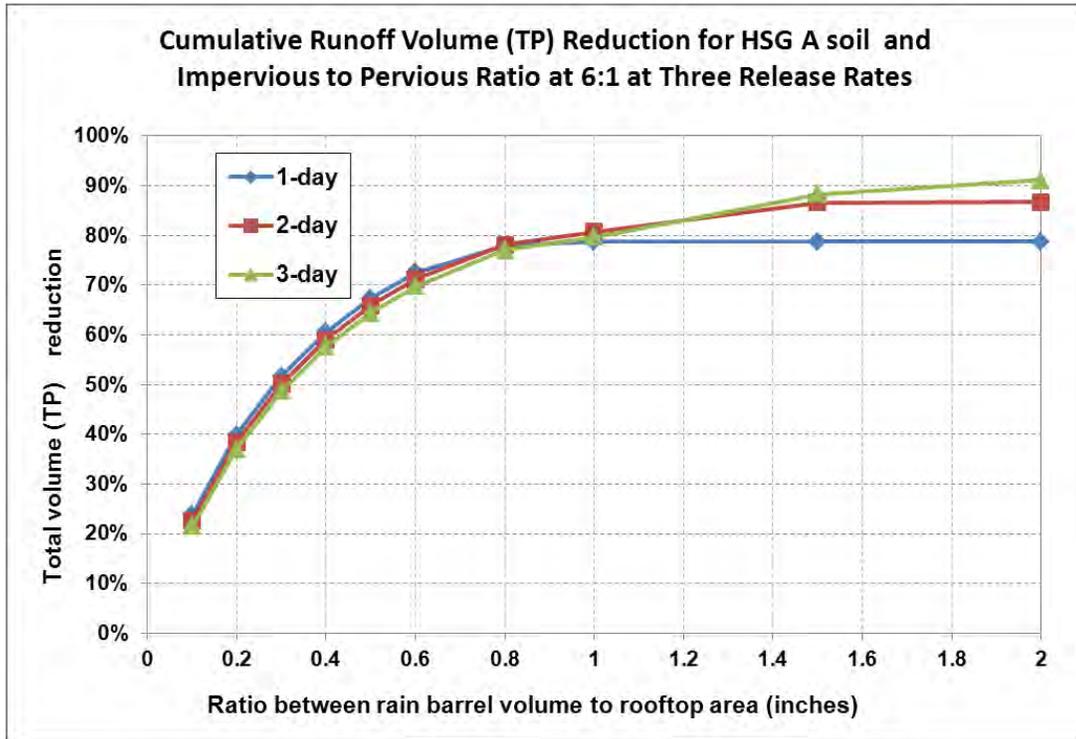
**Figure 3- 21: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1 for HSG D Soils**



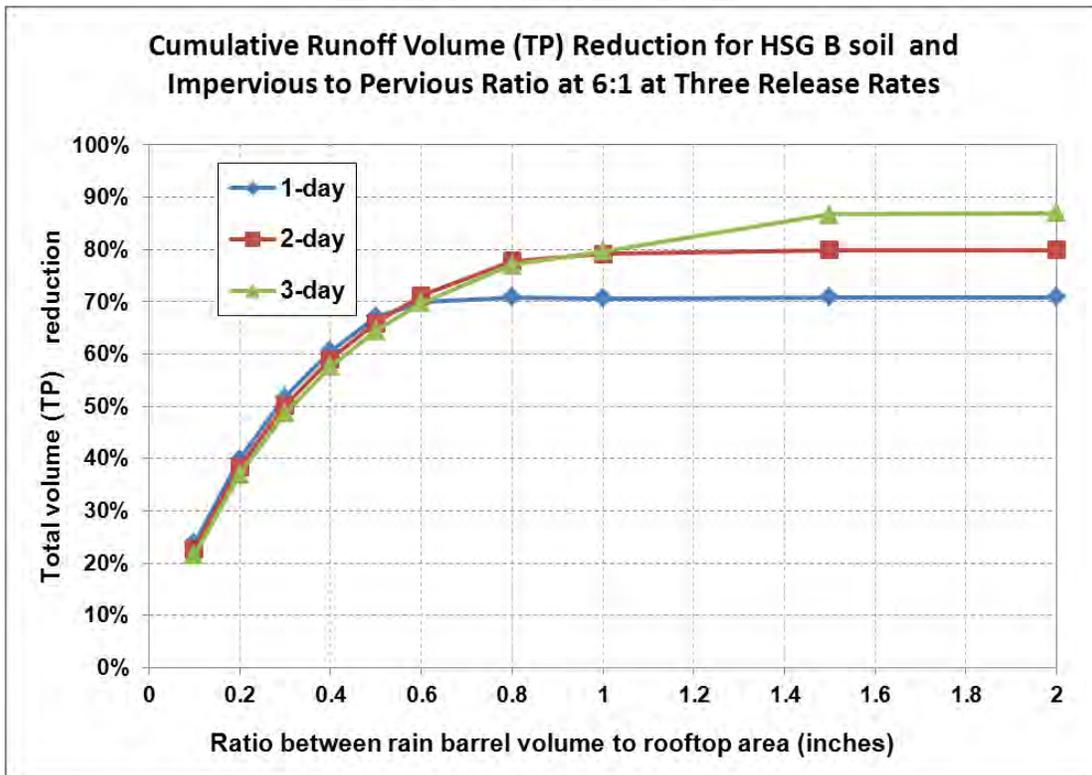
**Table 3- 23: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1**

Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1												
Rain barrel volume to impervious area ratio	Total Runoff Volume and Phosphorus Load (TP) Reduction Percentages											
	HSG A			HSG B			HSG C			HSG D		
	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day
0.1 in	24%	23%	22%	24%	23%	22%	24%	23%	22%	23%	23%	22%
0.2 in	40%	38%	37%	40%	38%	37%	40%	38%	37%	28%	30%	33%
0.3 in	52%	50%	49%	52%	50%	49%	47%	50%	49%	29%	31%	34%
0.4 in	61%	59%	58%	61%	59%	58%	48%	55%	58%	29%	31%	34%
0.5 in	67%	66%	64%	67%	66%	64%	48%	57%	63%	29%	31%	34%
0.6 in	73%	71%	70%	70%	71%	70%	48%	57%	65%	29%	31%	34%
0.8 in	78%	78%	77%	71%	78%	77%	48%	57%	66%	29%	31%	34%
1.0 in	79%	81%	80%	71%	79%	80%	48%	57%	66%	29%	31%	34%
1.5 in	79%	87%	88%	71%	80%	87%	48%	57%	66%	29%	31%	34%
2.0 in	79%	87%	91%	71%	80%	87%	48%	57%	66%	29%	31%	34%

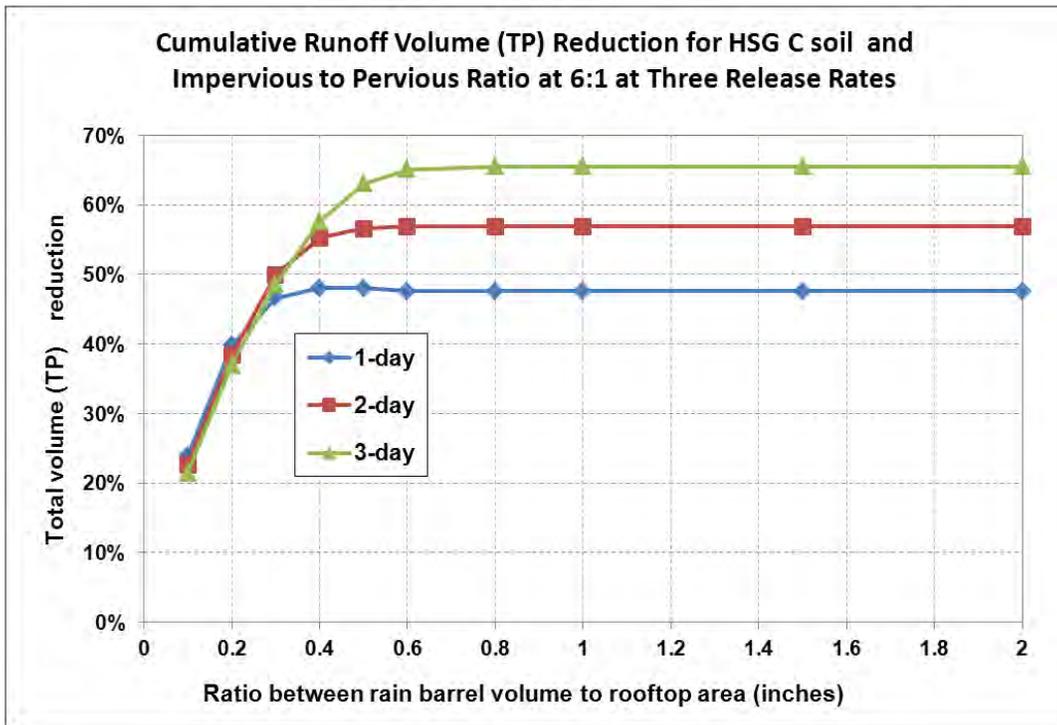
**Figure 3- 22: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1 for HSG A Soils**



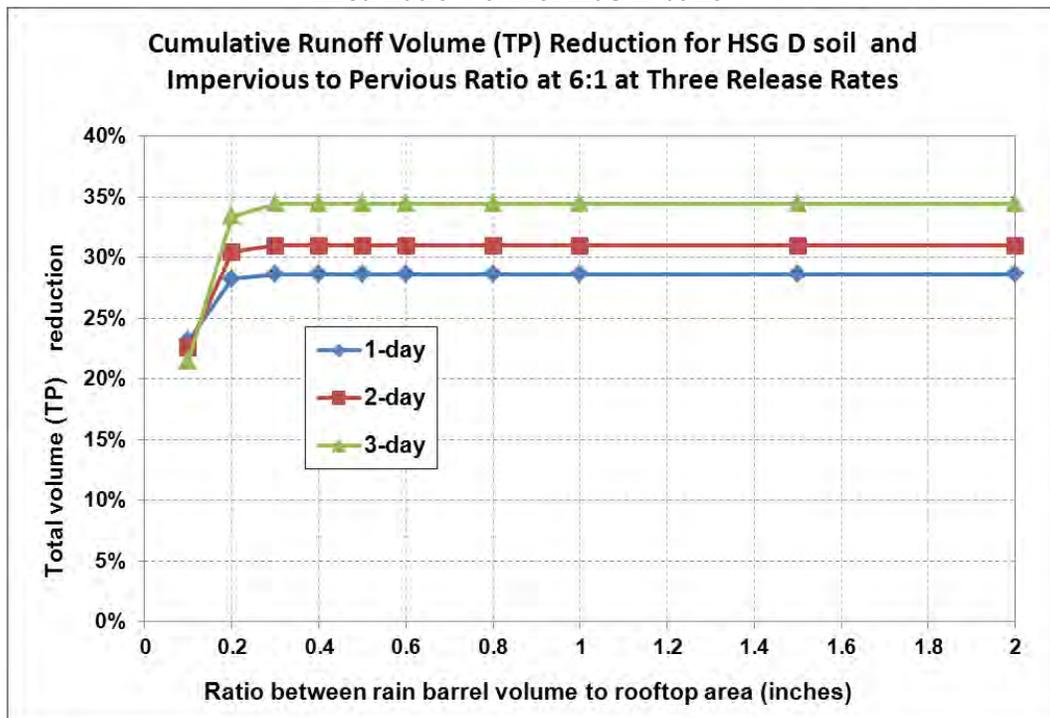
**Figure 3- 23: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1 for HSG B Soils**



**Figure 3- 24: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1 for HSG C Soils**



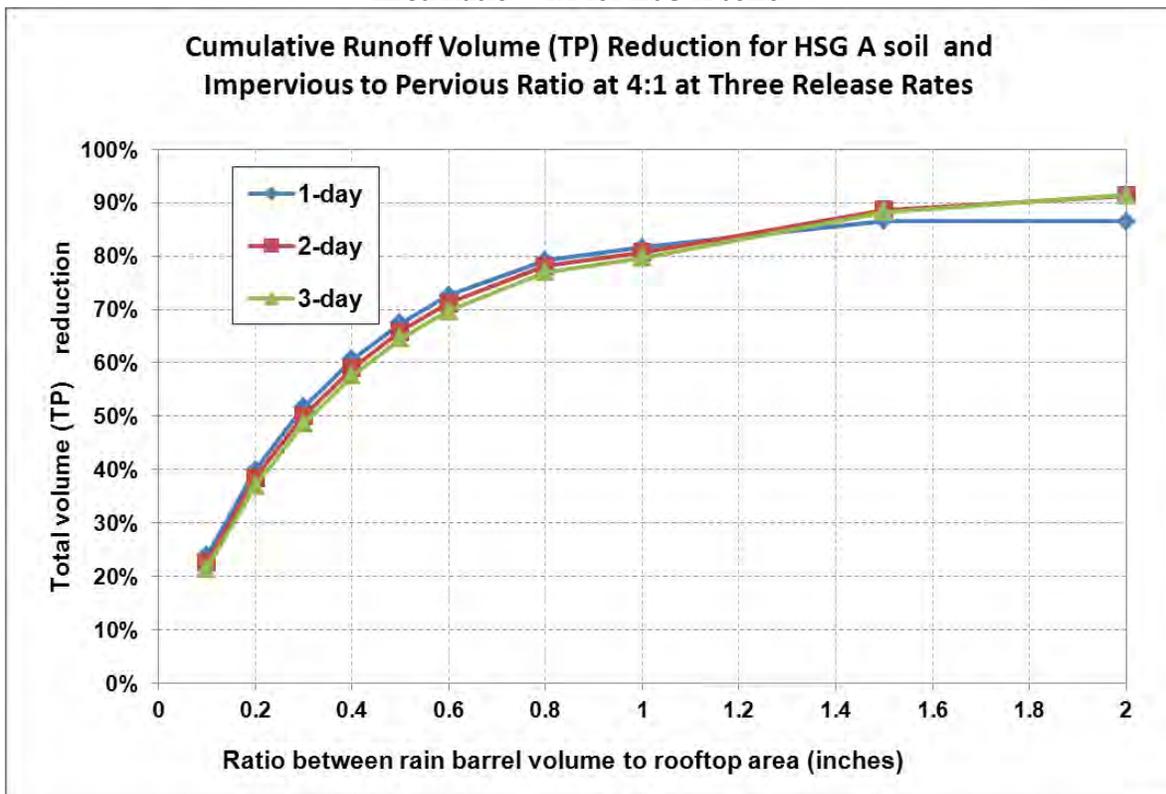
**Figure 3- 25: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1 for HSG D Soils**



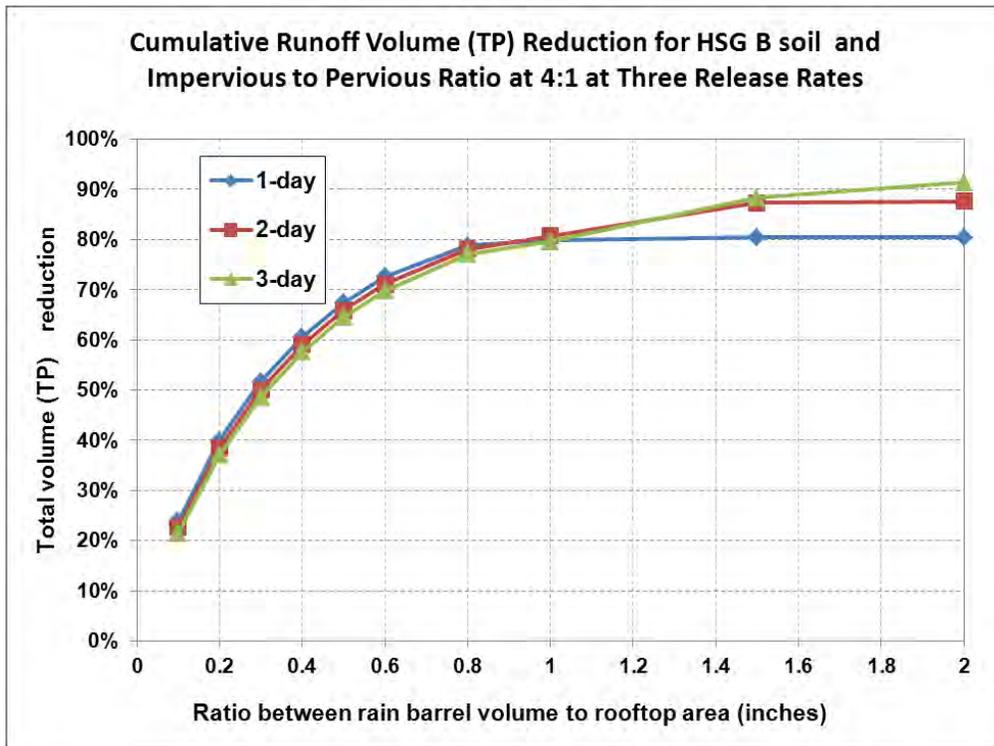
**Table 3- 24: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1**

Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1												
Storage volume to impervious area ratio	Total Runoff Volume and Phosphorus Load (TP) Reduction Percentages											
	HSG A			HSG B			HSG C			HSG D		
	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day
0.1 in	24%	23%	22%	24%	23%	22%	24%	23%	22%	24%	23%	22%
0.2 in	40%	38%	37%	40%	38%	37%	40%	38%	37%	37%	37%	37%
0.3 in	52%	50%	49%	52%	50%	49%	52%	50%	49%	39%	42%	45%
0.4 in	61%	59%	58%	61%	59%	58%	58%	59%	58%	39%	42%	47%
0.5 in	67%	66%	64%	67%	66%	64%	60%	65%	64%	40%	42%	47%
0.6 in	73%	71%	70%	73%	71%	70%	61%	68%	70%	40%	42%	47%
0.8 in	79%	78%	77%	79%	78%	77%	61%	69%	75%	40%	42%	47%
1.0 in	82%	81%	80%	80%	81%	80%	61%	69%	76%	40%	42%	47%
1.5 in	87%	89%	88%	80%	87%	88%	61%	69%	76%	40%	42%	47%
2.0 in	87%	91%	91%	80%	88%	91%	61%	69%	76%	40%	42%	47%

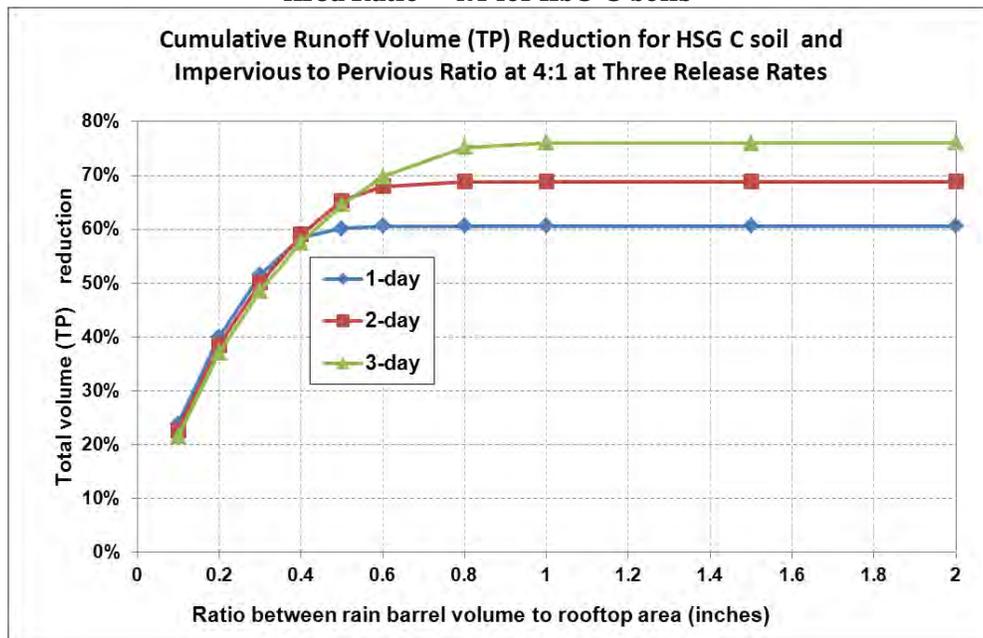
**Figure 3- 26: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1 for HSG A Soils**



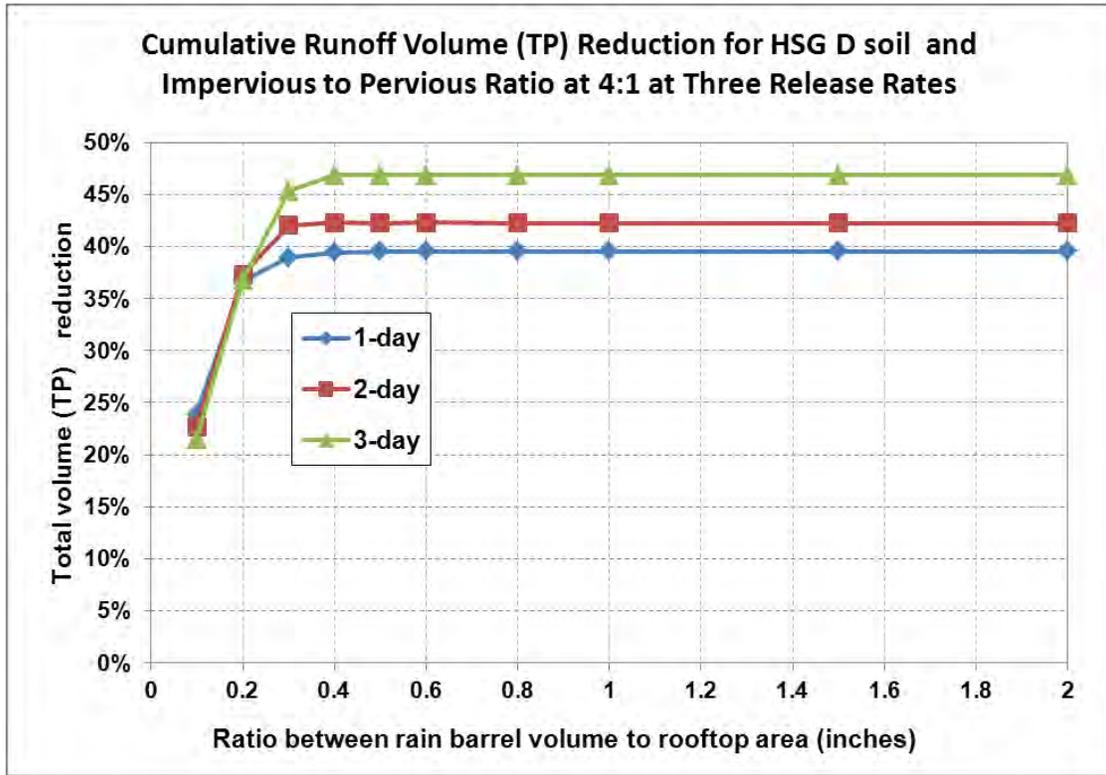
**Figure 3- 27: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1 for HSG B Soils**



**Figure 3- 28: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1 for HSG C Soils**



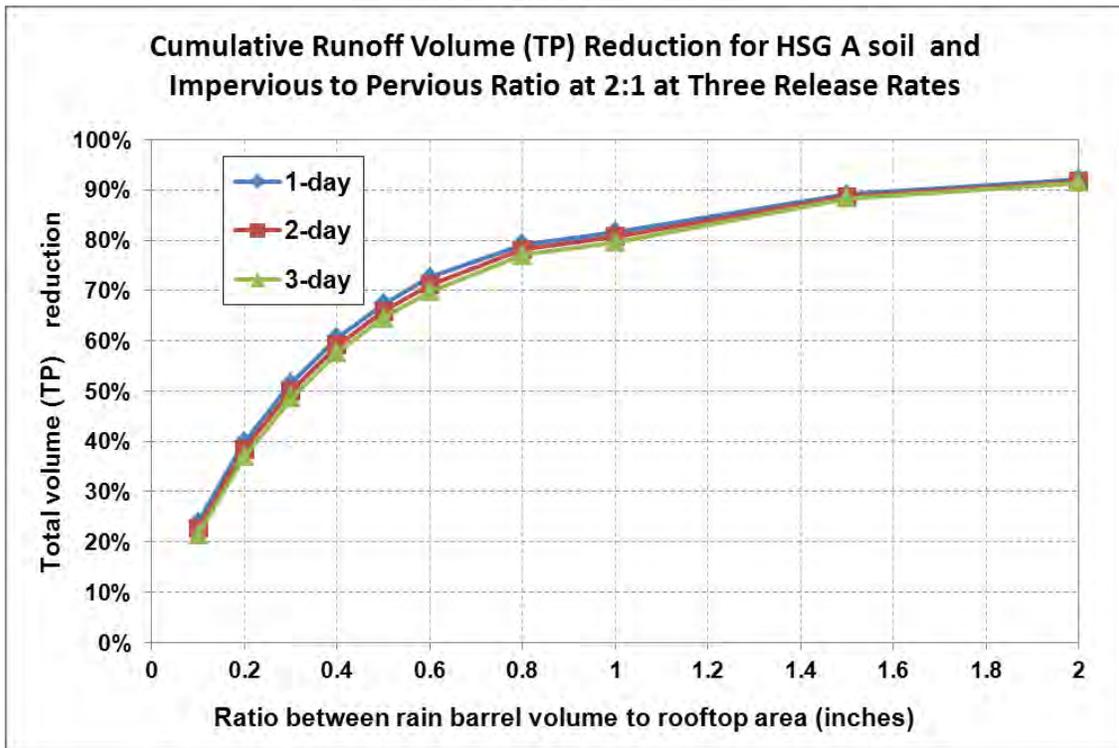
**Figure 3- 29: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1 for HSG D Soils**



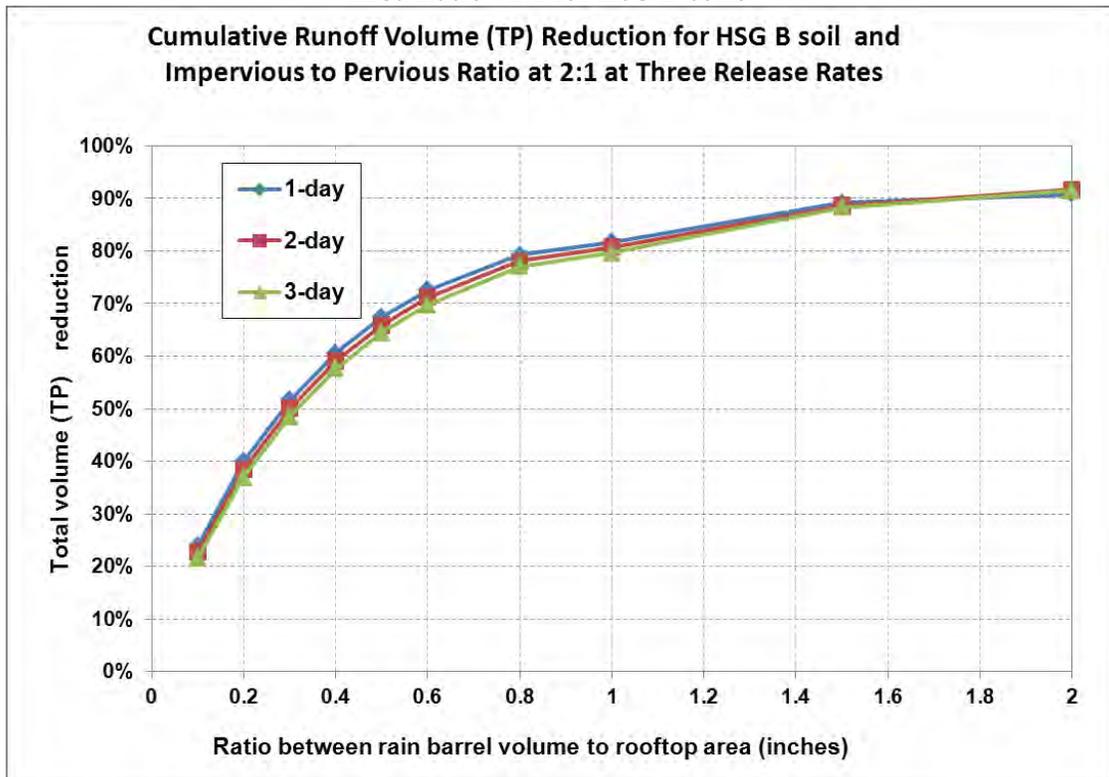
**Table 3- 25: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 2:1**

Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 2:1												
Storage volume to impervious area ratio	Total Runoff Volume and Phosphorus Load (TP) Reduction Percentages											
	HSG A			HSG B			HSG C			HSG D		
	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day
0.1 in	24%	23%	22%	24%	23%	22%	24%	23%	22%	24%	23%	22%
0.2 in	40%	38%	37%	40%	38%	37%	40%	38%	37%	40%	38%	37%
0.3 in	52%	50%	49%	52%	50%	49%	52%	50%	49%	51%	50%	49%
0.4 in	61%	59%	58%	61%	59%	58%	61%	59%	58%	57%	58%	57%
0.5 in	67%	66%	64%	67%	66%	64%	67%	66%	64%	59%	62%	63%
0.6 in	73%	71%	70%	73%	71%	70%	72%	71%	70%	59%	62%	67%
0.8 in	79%	78%	77%	79%	78%	77%	77%	78%	77%	59%	62%	67%
1.0 in	82%	81%	80%	82%	81%	80%	78%	81%	80%	59%	62%	67%
1.5 in	89%	89%	88%	89%	89%	88%	78%	84%	88%	59%	62%	67%
2.0 in	92%	92%	91%	91%	92%	91%	78%	84%	89%	59%	62%	67%

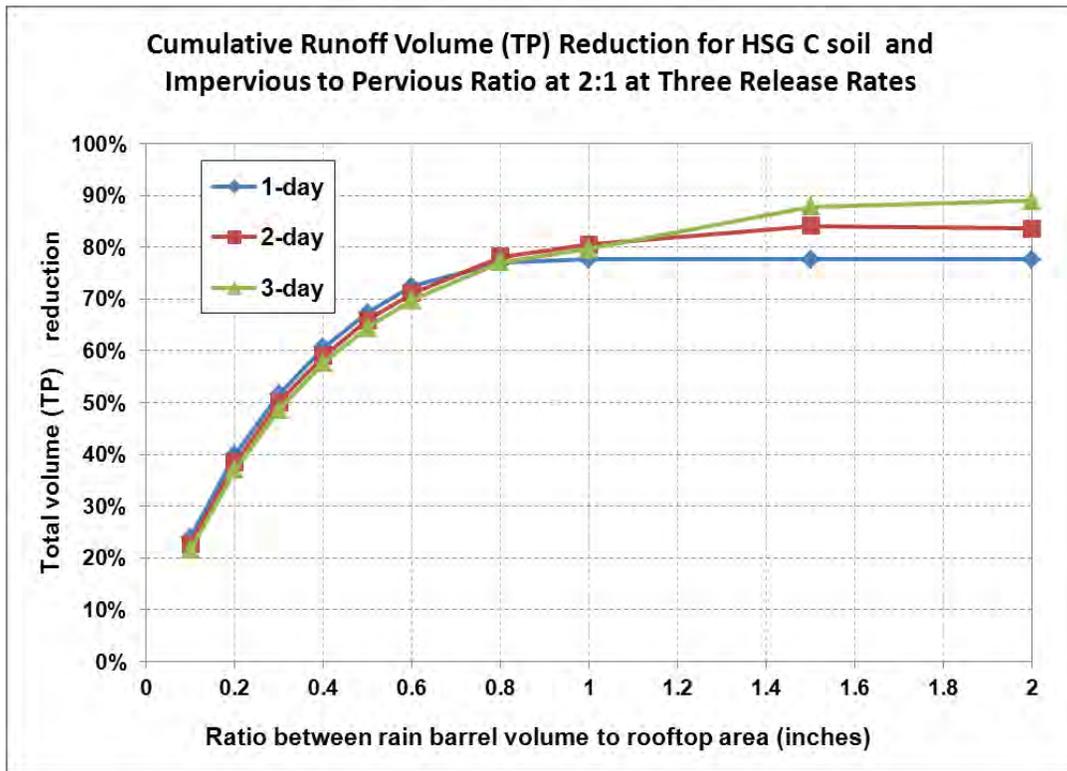
**Figure 3- 30: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio= 2:1 for HSG A Soils**



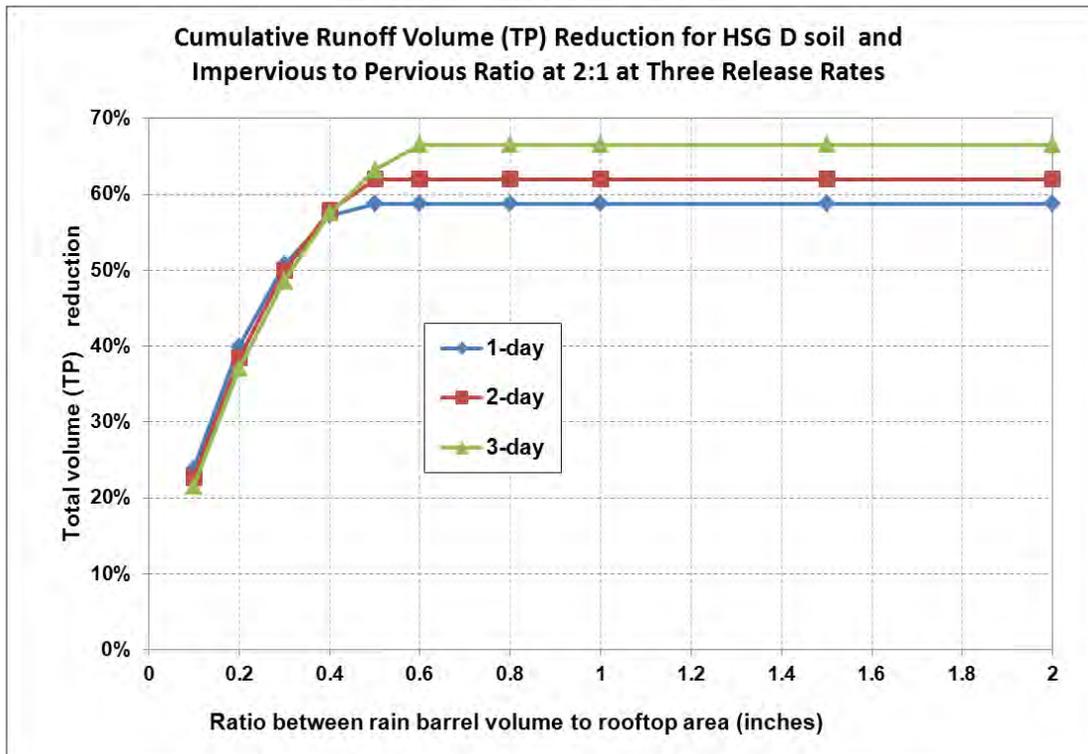
**Figure 3- 31: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio= 2:1 for HSG B Soils**



**Figure 3- 32: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio= 2:1 for HSG C Soils**



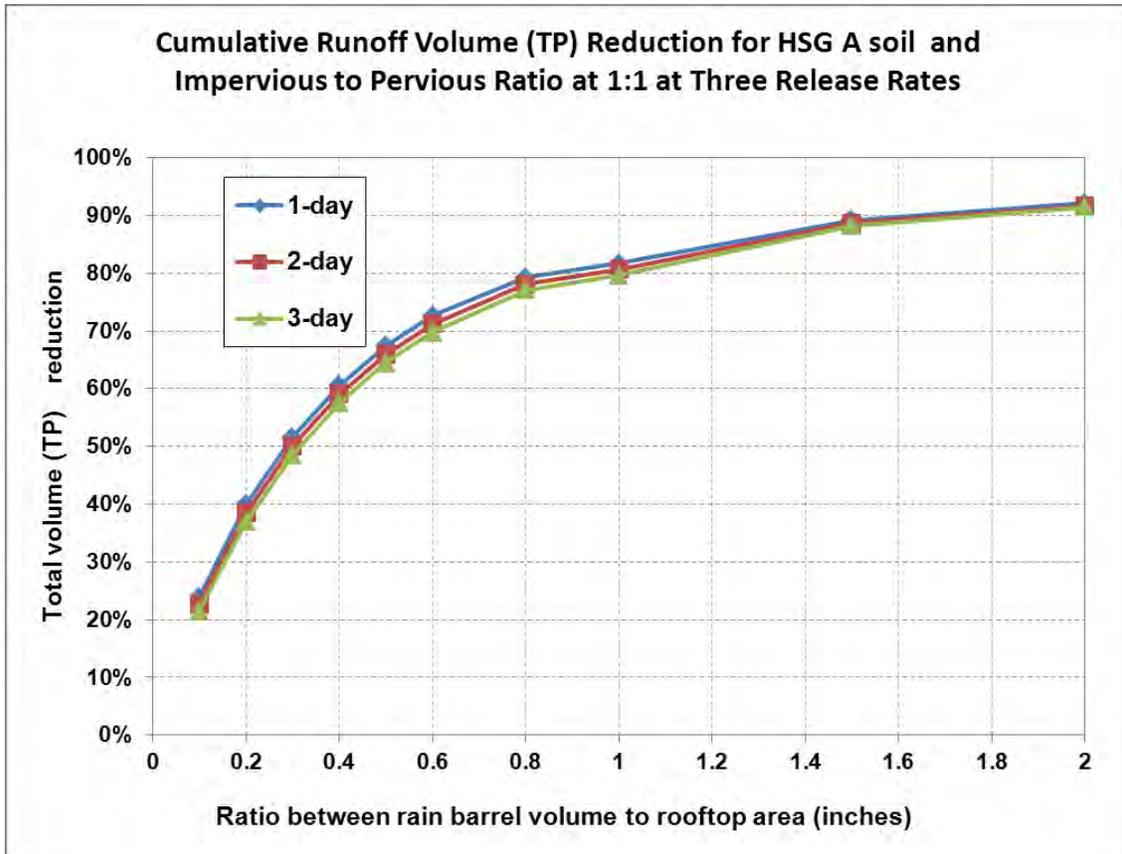
**Figure 3- 33: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio= 2:1 for HSG D Soils**



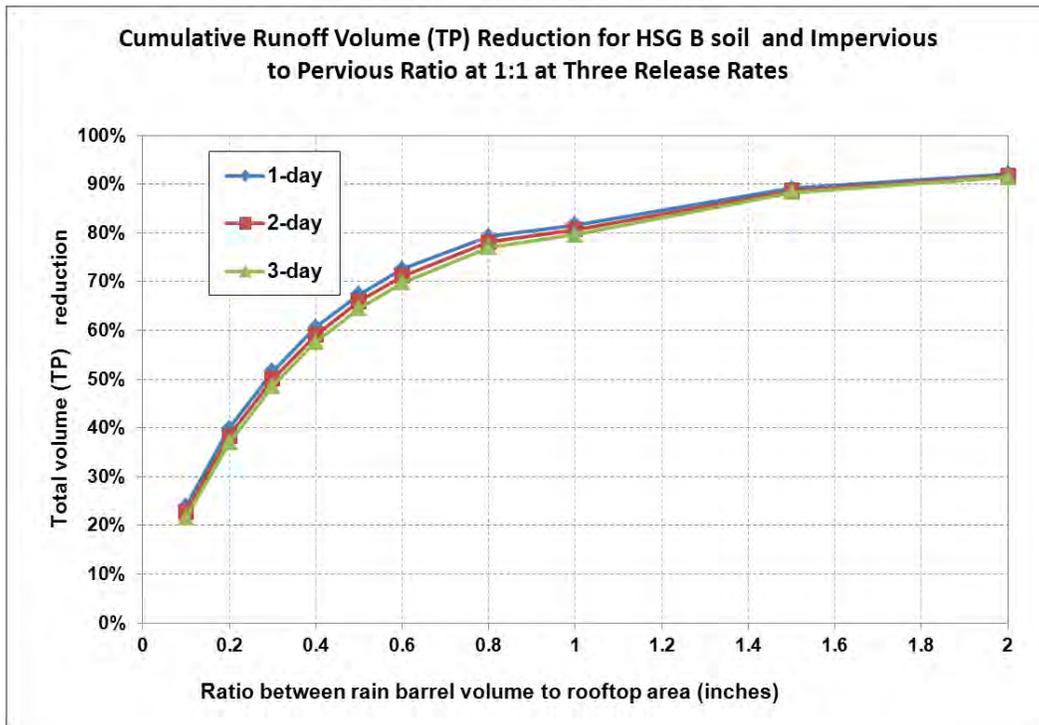
**Table 3- 26: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1**

Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1												
Storage volume to impervious area ratio	Total Runoff Volume and Phosphorus Load (TP) Reduction Percentages											
	HSG A			HSG B			HSG C			HSG D		
	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	3-day
0.1 in	24%	23%	22%	24%	23%	22%	24%	23%	22%	24%	23%	22%
0.2 in	40%	38%	37%	40%	38%	37%	40%	38%	37%	40%	38%	37%
0.3 in	52%	50%	49%	52%	50%	49%	52%	50%	49%	52%	50%	49%
0.4 in	61%	59%	58%	61%	59%	58%	61%	59%	58%	61%	59%	58%
0.5 in	67%	66%	64%	67%	66%	64%	67%	66%	64%	67%	66%	64%
0.6 in	73%	71%	70%	73%	71%	70%	73%	71%	70%	72%	71%	70%
0.8 in	79%	78%	77%	79%	78%	77%	79%	78%	77%	78%	78%	77%
1.0 in	82%	81%	80%	82%	81%	80%	82%	81%	80%	79%	80%	80%
1.5 in	89%	89%	88%	89%	89%	88%	89%	89%	88%	80%	82%	86%
2.0 in	92%	92%	91%	92%	92%	91%	91%	92%	91%	80%	82%	86%

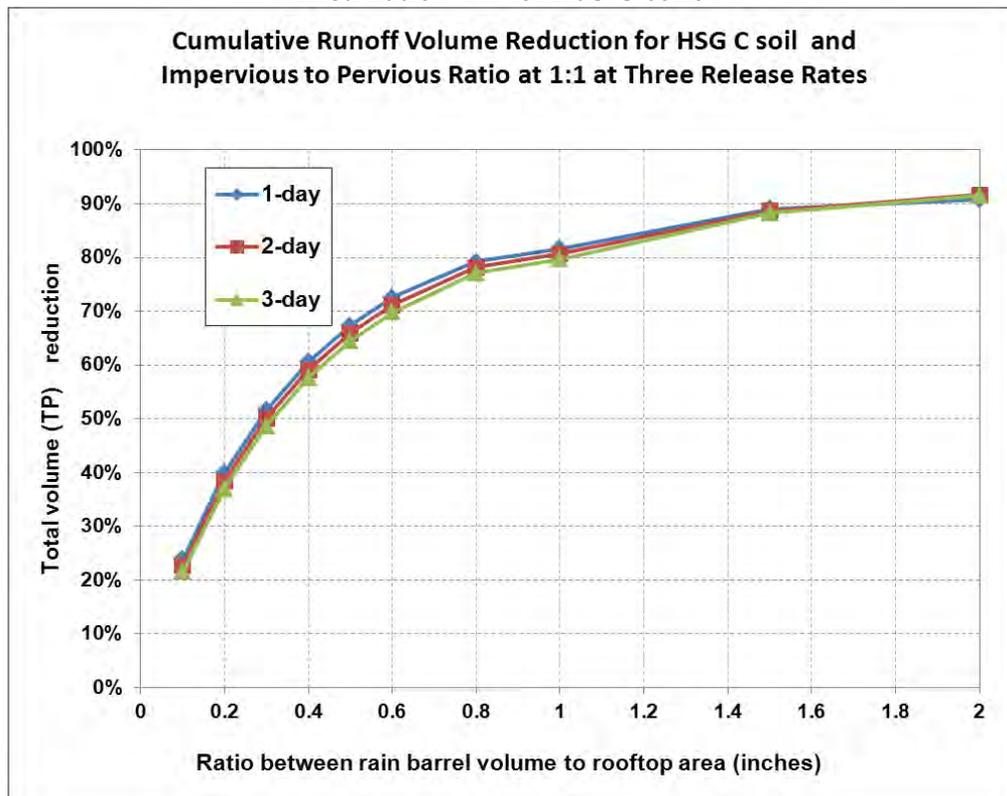
**Figure 3- 34: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1 for HSG A Soils**



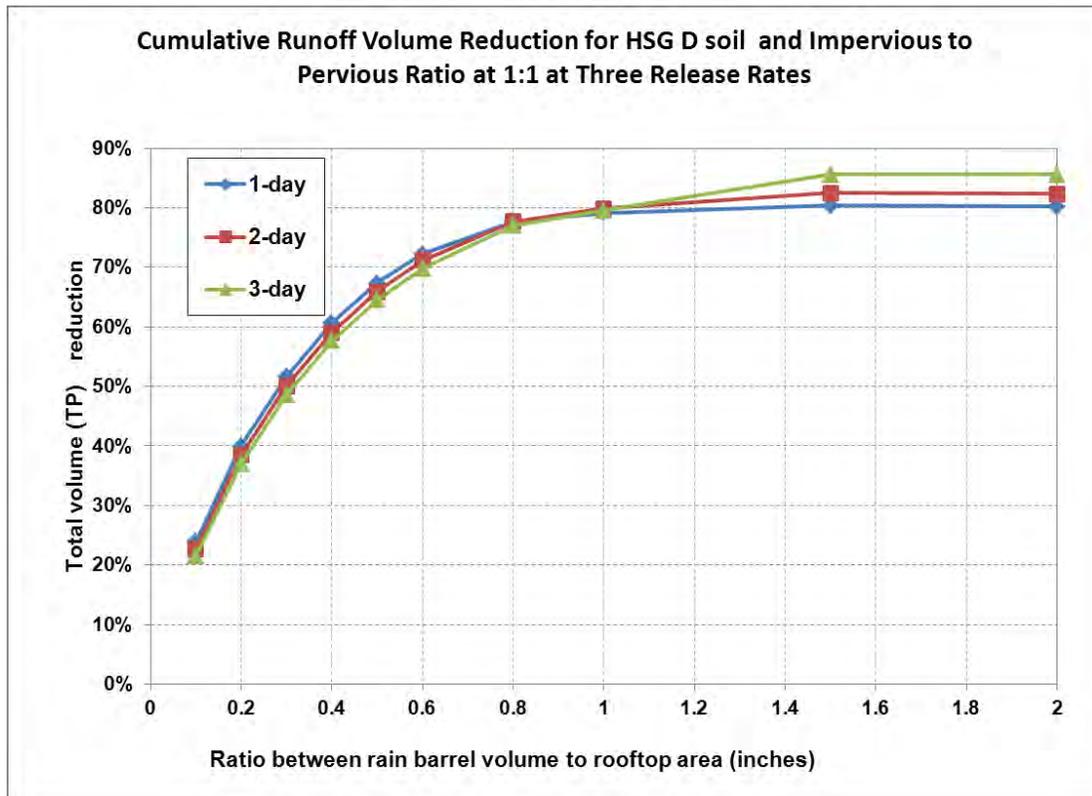
**Figure 3- 35: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1 for HSG B Soils**



**Figure 3- 36: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1 for HSG C Soils**



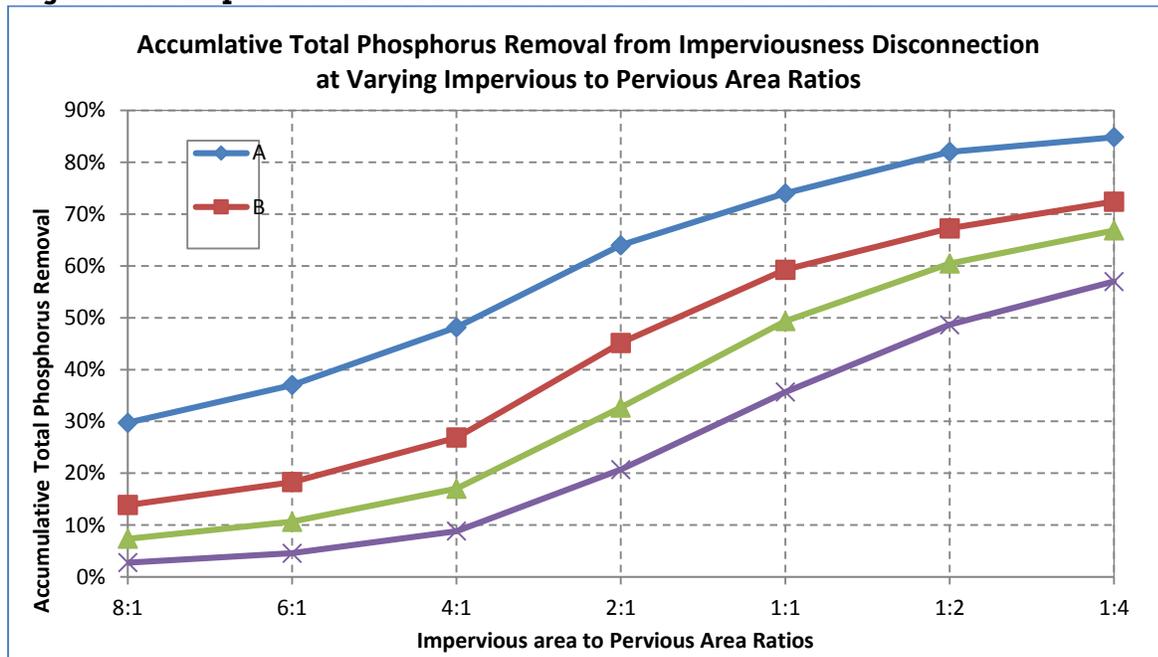
**Figure 3- 37: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1 for HSG D Soils**



**Table 3- 27: Impervious Area Disconnection Performance Table**

Impervious area to pervious area ratio	Soil type of Receiving Pervious Area			
	HSG A	HSG B	HSG C	HSG D
8:1	30%	14%	7%	3%
6:1	37%	18%	11%	5%
4:1	48%	27%	17%	9%
2:1	64%	45%	33%	21%
1:1	74%	59%	49%	36%
1:2	82%	67%	60%	49%
1:4	85%	72%	67%	57%

**Figure 3- 38: Impervious Area Disconnection Performance Curves**



**Table 3- 28: Performance Table for Conversion of Impervious Areas to Pervious Area based on Hydrological Soil Groups**

Land-Use Group	Cumulative Reduction in Annual Stormwater Phosphorus Load				
	Conversion of impervious area to pervious area-HSG A	Conversion of impervious area to pervious area-HSG B	Conversion of impervious area to pervious area-HSG C	Conversion of impervious area to pervious area-HSG C/D	Conversion of impervious area to pervious area-HSG D
Commercial (Com) and Industrial (Ind)	98.5%	93.5%	88.0%	83.5%	79.5%
Multi-Family (MFR) and High-Density Residential (HDR)	98.8%	95.0%	90.8%	87.3%	84.2%
Medium -Density Residential (MDR)	98.6%	94.1%	89.1%	85.0%	81.4%
Low Density Residential (LDR) - "Rural"	98.2%	92.4%	85.9%	80.6%	75.9%
Highway (HWY)	98.0%	91.3%	84.0%	78.0%	72.7%
Forest (For)	98.2%	92.4%	85.9%	80.6%	75.9%
Open Land (Open)	98.2%	92.4%	85.9%	80.6%	75.9%
Agriculture (Ag)	70.6%	70.6%	70.6%	70.6%	70.6%

Appendix F Attachment 3

**Table 3- 29: Performance Table for Conversion of Low Permeable Pervious Area to High Permeable Pervious Area based on Hydrological Soil Group**

Land Cover	Cumulative Reduction in Annual SW Phosphorus Load from Pervious Area				
	Conversion of pervious area HSG D to pervious area-HSG A	Conversion of pervious area HSG D to pervious area-HSG B	Conversion of pervious area HSG D to pervious area-HSG C	Conversion of pervious area HSG C to pervious area-HSG A	Conversion of pervious area HSG C to pervious area-HSG B
Developed Pervious Land	92.7%	68.3%	41.5%	83.5%	79.5%

**Table 3-30 Method for determining stormwater control design volume (DSV) (i.e., capacity) using Long-term cumulative performance curves**

Stormwater Control Type	Description	Applicable Structural Stormwater Control Performance Curve	Equation for calculating Design Storage Capacity for Estimating Cumulative Reductions using Performances Curves
<b>Infiltration Trench</b>	Provides temporary storage of runoff using the void spaces within the soil/sand/gravel mixture that is used to backfill the trench for subsequent infiltration into the surrounding sub-soils.	Infiltration Trench (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = void space volumes of gravel and sand layers $DSV = (L \times W \times D_{stone} \times n_{stone}) + (L \times W \times D_{sand} \times n_{sand})$
<b>Subsurface Infiltration</b>	Provides temporary storage of runoff using the combination of storage structures (e.g., galleys, chambers, pipes, etc.) and void spaces within the soil/sand/gravel mixture that is used to backfill the system for subsequent infiltration into the surrounding sub-soils.	Infiltration Trench (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = Water storage volume of storage units and void space volumes of backfill materials. Example for subsurface galleys backfilled with washed stone: $DSV = (L \times W \times D)_{galley} + (L \times W \times D_{stone} \times n_{stone})$
<b>Surface Infiltration</b>	Provides temporary storage of runoff through surface ponding storage structures (e.g., basin or swale) for subsequent infiltration into the underlying soils.	Infiltration Basin (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = Water volume of storage structure before bypass. Example for linear trapezoidal vegetated swale $DSV = (L \times ((W_{bottom} + W_{top@Dmax}) / 2) \times D)$
<b>Rain Garden/Bio-retention (no underdrains)</b>	Provides temporary storage of runoff through surface ponding and possibly void spaces within the soil/sand/gravel mixture that is used to filter runoff prior to infiltration into underlying soils.	Infiltration Basin (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = Ponding water storage volume and void space volumes of soil filter media. Example for raingarden : $DSV = (A_{pond} \times D_{pond}) + (A_{soil} \times D_{soil} \times n_{soil\ mix})$
<b>Tree Filter (no underdrain)</b>	Provides temporary storage of runoff through surface ponding and void spaces within the soil/sand/gravel mixture that is used to filter runoff prior to infiltration into underlying soils.	Infiltration Trench (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = Ponding water storage volume and void space volumes of soil filter media. $DSV = (L \times W \times D_{ponding}) + (L \times W \times D_{soil} \times n_{soil\ mix})$
<b>Bio-Filtration (w/underdrain)</b>	Provides temporary storage of runoff for filtering through an engineered soil media. The storage capacity includes void spaces in the filter media and temporary ponding at the surface. After runoff has passed through the filter media it is collected by an underdrain pipe for discharge. Manufactured or packaged bio-filter systems such as tree box filters may be suitable for using the bio-filtration performance results.	Bio-filtration	DSV = Ponding water storage volume and void space volume of soil filter media. Example of a linear biofilter: $DSV = (L \times W \times D_{ponding}) + (L \times W \times D_{soil} \times n_{soil})$
<b>Gravel Wetland</b>	Based on design by the UNH Stormwater Center (UNHSC). Provides temporary surface ponding storage of runoff in a vegetated wetland cell that is eventually routed to an underlying saturated gravel internal storage reservoir (ISR) for nitrogen treatment. Outflow is controlled by an elevated orifice that has its invert elevation equal to the top of the ISR layer and provides a retention time of at least 24 hours.	Gravel Wetland	DSV = pretreatment volume + ponding volume + void space volume of gravel ISR. $DSV = (A_{pretreatment} \times D_{pretreatment}) + (A_{wetland} \times D_{ponding}) + (A_{ISR} \times D_{gravel} \times n_{gravel})$
<b>Porous Pavement with subsurface infiltration</b>	Provides filtering of runoff through a filter course and temporary storage of runoff within the void spaces of a subsurface gravel reservoir prior to infiltration into subsoils.	Infiltration Trench (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = void space volumes of gravel layer $DSV = (L \times W \times D_{stone} \times n_{stone})$
<b>Porous pavement w/ impermeable underliner w/underdrain</b>	Provides filtering of runoff through a filter course and temporary storage of runoff within the void spaces prior to discharge by way of an underdrain.	Porous Pavement	Depth of Filter Course = $D_{FC}$
<b>Wet Pond</b>	Provides treatment of runoff through routing through permanent pool.	Wet Pond	DSV= Permanent pool volume prior to high flow bypass $DSV = A_{pond} \times D_{pond}$ (does not include pretreatment volume)
<b>Extended Dry Detention Basin</b>	Provides temporary detention storage for the design storage volume to drain in 24 hours through multiple out let controls.	Dry Pond	DSV= Ponding volume prior to high flow bypass $DSV = A_{pond} \times D_{pond}$ (does not include pretreatment volume)
<b>Dry Water Quality Swale/Grass Swale</b>	Based on MA design standards. Provides temporary surface ponding storage of runoff in an open vegetated channel through permeable check dams. Treatment is provided by filtering of runoff by vegetation and check dams and infiltration into subsurface soils.	Grass swale	DSV = Volume of swale at full design depth $DSV = L_{swale} \times A_{swale}$
<b>Definitions:</b> DSV= Design Storage Volume = physical storage capacity to hold water; VSV = Void Space Volume; L = length, W = width, D = depth at design capacity before bypass, n = porosity fill material, A= average surface area for calculating volume; <b>Infiltration rate</b> = saturated soil hydraulic conductivity			

**Appendix G**  
**Massachusetts Small MS4 Permit Monitoring Requirements**  
**For Discharges into Impaired Waters – Parameters and Methods**

Pollutant Causing Impairment	Monitoring Parameter	EPA or Approved Method No.
Aluminum	Aluminum, Total	200.7; 200.8; 200.9
Ammonia (Un-ionized)	Ammonia – Nitrogen	350.1
Arsenic	Arsenic, Total	200.7; 200.8; 200.9
Cadmium	Cadmium, Total	200.7; 200.8; 200.9
Chlordane	NMR	608; 625
Chloride	Chloride	300
Chromium (total)	Chromium, Total	200.7; 200.8; 200.9
Copper	Copper, Total	200.7; 200.8; 200.9
DDT	NMR	608; 625
DEHP (Di-sec-octyl phthalate)	NMR	---
Dioxin (including 2,3,7,8-TCDD)	NMR	613; 1613
Dioxin (2,3,7,8-Tetrachlorodibenzo-p-dioxin only)	NMR	613
Lead	Lead, Total	200.7; 200.8; 200.9
Mercury in Water Column	NMR unless potentially present such (e.g., salvage yards crushing vehicles with Hg switches)	200.7; 200.8; 200.9
Nitrogen (Total)	Nitrogen, Total	351.1/351.2 + 353.2
Pentachlorophenol (PCP)	NMR	---
Petroleum Hydrocarbons	Oil and Grease	1664
Phosphorus (Total)	Phosphorus, Total	365.1; 365.2; 365.3; SM 4500-P-E
Polychlorinated biphenyls	NMR	---
Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)	PAHs	610; 1625
Sulfide-Hydrogen Sulfide	NMR	---
Mercury in Fish Tissue	NMR	---
PCB in Fish Tissue	NMR	---
Total Dissolved Solids	Total Dissolved Solids	160.1
Total Suspended Solids (TSS)	Total Suspended Solids	160.2, 180.1
Turbidity	Total Suspended Solids and Turbidity	160.2, 180.1
Secchi disk transparency	Total Suspended Solids	160.2
Sediment Screening Value (Exceedence)	Total Suspended Solids	160.2

Sedimentation/Siltation	Total Suspended Solids	160.2
Bottom Deposits	Total Suspended Solids	160.2
Color	NMR	---
pH, High	pH	150.2
pH, Low	pH	150.2
Taste and Odor	NMR	---
Temperature, water	NMR	---
Salinity	Specific Conductance	120.1
Enterococcus	Enterococcus	1106.1; 1600; Enterolert® 12 22.
Escherichia coli	E. coli	1103.1; 1603; Colilert® 12 16, Colilert-18® 12 15 16.; mColiBlue- 24®17.
Fecal Coliform	Fecal Coliform	1680; 1681
Organic Enrichment (Sewage) Biological Indicators	Enterococcus (marine waters) or E. coli (freshwater)	1106.1; 1600
Debris/Floatables/Trash	NMR	or
Foam/Flocs/Scum/Oil Slicks	Contact MassDEP	1103.1; 1603
Oil and Grease	Oil and Grease	---
Chlorophyll-a	Total Phosphorus (freshwater)	---
	Total Nitrogen (marine waters)	1664
Nutrient/Eutrophication Biological Indicators	Total Phosphorus (freshwater)	365.1; 365.2; 365.3
	Total Nitrogen (marine waters)	351.1/351.2 + 353.2
Dissolved oxygen saturation / Oxygen, Dissolved	Dissolved Oxygen	365.1; 365.2; 365.3
	Temperature	351.1/351.2 + 353.2
	BOD <sub>5</sub>	360.1; 360.2
	Total Phosphorus (freshwater)	SM-2550
	Total Nitrogen (marine waters)	SM-5210
Excess Algal Growth	Total Phosphorus (freshwater)	365.1; 365.2; 365.3
	Total Nitrogen (marine waters)	351.1/351.2 + 353.2
Aquatic Plants (Macrophytes)	NMR	---

Abnormal Fish deformities, erosions, lesions, tumors (DELTS)	NMR	---
Abnormal Fish Histology (Lesions)	NMR	---
Estuarine Bioassessments	Contact MassDEP	---
Fishes Bioassessments	Contact MassDEP	---
Aquatic Macroinvertebrate Bioassessments	Contact MassDEP	---
Combined Biota/Habitat Bioassessments	Contact MassDEP	---
Habitat Assessment (Streams)	Contact MassDEP	---
Lack of a coldwater assemblage	Contact MassDEP	---
Fish Kills	Contact MassDEP	---
Whole Effluent Toxicity (WET)	Contact MassDEP	---
Ambient Bioassays -- Chronic Aquatic Toxicity	Contact MassDEP	---
Sediment Bioassays -- Acute Toxicity Freshwater	Contact MassDEP	---
Sediment Bioassays -- Chronic Toxicity Freshwater	Contact MassDEP	---
Fish-Passage Barrier	NMR	---
Alteration in stream-side or littoral vegetative covers	NMR	---
Low flow alterations	NMR	---
Other flow regime alterations	NMR	---
Physical substrate habitat alterations	NMR	---
Other anthropogenic substrate alterations	NMR	---
Non-Native Aquatic Plants	NMR	---
Eurasian Water Milfoil, <i>Myriophyllum spicatum</i>	NMR	---
Zebra mussel, <i>Dreissena polymorph</i>	NMR	---
Other	Contact MassDEP	---

Notes:

NMR” indicates no monitoring required

“Total Phosphorus (freshwater)” indicates monitoring required for total phosphorus where stormwater discharges to a water body that is freshwater

“Total Nitrogen (marine water)” indicates monitoring required for total nitrogen where stormwater discharges to a water body that is a marine or estuarine water

**APPENDIX H**

Requirements Related to Discharges to Certain Water Quality Limited Waterbodies

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Attachment 1- Nitrogen Reduction Credits For Selected Structural BMPs

**I. Discharges to water quality limited waterbodies and their tributaries where nitrogen is the cause of the impairment**

1. Part 2.2.2.a.i. of the permit identifies the permittees subject to additional requirements to address nitrogen in their stormwater discharges because they discharge to waterbodies that are water quality limited due to nitrogen, or their tributaries, without an EPA approved TMDL. Permittees identified in part 2.2.2.a.i of the permit must identify and implement BMPs designed to reduce nitrogen discharges in the impaired catchment(s). To address nitrogen discharges each permittee shall comply with the following requirements:

a. Additional or Enhanced BMPs

i. The permittee remains subject to all the requirements of part 2.3. of the permit and shall include the following enhancements to the BMPs required by part 2.3 of the permit:

1. Part 2.3.2, Public education and outreach: The permittee shall supplement its Residential and Business/Commercial/Institution program with annual timed messages on specific topics. The permittee shall distribute an annual message in the spring (April/May) timeframe that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release fertilizers. The permittee shall distribute an annual message in the summer (June/July) timeframe encouraging the proper management of pet waste, including noting any existing ordinances where appropriate. The permittee shall distribute an annual message in the Fall (August/September/October) timeframe encouraging the proper disposal of leaf litter. The permittee shall deliver an annual

message on each of these topics, unless the permittee determines that one or more of these issues is not a significant contributor of nitrogen to discharges from the MS4 and the permittee retains documentation of this finding in the SWMP. All public education messages can be combined with requirements of Appendix H part II and III as well as Appendix F part A.III, A.IV, A.V, B.I, B.II and B.III where appropriate.

2. Part 2.3.6, 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; retrofit inventory and priority ranking under 2.3.6.1.b shall include consideration of BMPs to reduce nitrogen discharges.
3. Part 2.3.7, Good House Keeping and Pollution Prevention for Permittee Owned Operations: establish requirements for use of slow release fertilizers on permittee owned property currently using fertilizer, in addition to reducing and managing fertilizer use as provided in 2.3.7.1; establish procedures to properly manage grass cuttings and leaf litter on permittee property, including prohibiting blowing organic waste materials onto adjacent 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, once in the spring (following winter activities such as sanding) and at least once in the fall (Sept 1 – Dec 1; following leaf fall).

b. Nitrogen Source Identification Report

- i. Within four years of the permit effective date the permittee shall complete a Nitrogen Source Identification Report. The report shall include the following elements:
  1. Calculation of total MS4 area draining to the water quality limited water segments or their tributaries, incorporating updated mapping of the MS4 and catchment delineations produced pursuant to part 2.3.4.6,
  2. All screening and monitoring results pursuant to part 2.3.4.7.d., targeting the receiving water segment(s)
  3. Impervious area and DCIA for the target catchment
  4. Identification, delineation and prioritization of potential catchments with high nitrogen loading
  5. Identification of potential retrofit opportunities or opportunities for the installation of structural BMPs during redevelopment
- ii. The final Nitrogen Source Identification Report shall be submitted to EPA as part of the year 4 annual report.

c. Potential Structural BMPs



- i. The permittee shall identify in its SWMP all activities that have been implemented in accordance with the requirements of Appendix H part I.1. as of the applicable date to reduce nitrogen in its discharges, including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
- ii. The permittee shall continue to implement all requirements of Appendix H part I.1. required to be done prior to the date of determination or the date of the approved TMDL, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications.

## **II. Discharges to water quality limited waterbodies and their tributaries where phosphorus is the cause of the impairment**

1. Part 2.2.2.b.i. of the permit identifies the permittees subject to additional requirements to address phosphorus in their stormwater discharges because they discharge to waterbodies that are water quality limited due to phosphorus, or their tributaries, without an EPA approved TMDL. Permittees identified in part 2.2.2.b.i. of the permit must identify and implement BMPs designed to reduce phosphorus discharges in the impaired catchment(s). To address phosphorus discharges each permittee shall comply with the following requirements:

- a. Additional or Enhanced BMPs

- i. The permittee remains subject to the requirements of part 2.3. of the permit and shall include the following enhancements to the BMPs required by part 2.3 of the permit:

1. Part 2.3.2, Public education and outreach: The permittee shall supplement its Residential and Business/Commercial/Institution program with annual timed messages on specific topics. The permittee shall distribute an annual message in the spring (March/April) timeframe that encourages the proper use and disposal of grass clippings and encourages the proper use of slow-release and phosphorous-free fertilizers. The permittee shall distribute an annual message in the summer (June/July) timeframe encouraging the proper management of pet waste, including noting any existing ordinances where appropriate. The permittee shall distribute an annual message in the fall (August/September/October) timeframe encouraging the proper disposal of leaf litter. The permittee shall deliver an annual message on each of these topics, unless the permittee determines that one or more of these issues is not a significant contributor of phosphorous to discharges from the MS4 and the permittee retains documentation of this finding in the SWMP. All public education messages can be combined with requirements of Appendix H part I and III as well as Appendix F part A.III, A.IV, A.V, B.I, B.II and B.III where appropriate.
2. Part 2.3.6, 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 phosphorus removal; retrofit inventory and priority ranking under 2.3.6.1.b shall include consideration of BMPs that infiltrate stormwater where feasible.
3. Part 2.3.7, Good House Keeping and Pollution Prevention for Permittee Owned Operations: Establish procedures to properly manage grass cuttings and leaf litter on permittee property, including prohibiting blowing organic waste materials onto adjacent impervious surfaces; 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, once in the spring (following winter activities such as sanding) and at least once in the fall (Sept 1 – Dec 1; following leaf fall).

b. Phosphorus Source Identification Report

- i. Within four years of the permit effective date the permittee shall complete a Phosphorus Source Identification Report. The report shall include the following elements:
  1. Calculation of total MS4 area draining to the water quality limited receiving water segments or their tributaries, incorporating updated mapping of the MS4 and catchment delineations produced pursuant to part 2.3.4.6,
  2. All screening and monitoring results pursuant to part 2.3.4.7.d., targeting the receiving water segment(s)
  3. Impervious area and DCIA for the target catchment
  4. Identification, delineation and prioritization of potential catchments with high phosphorus loading
  5. Identification of potential retrofit opportunities or opportunities for the installation of structural BMPs during redevelopment, including the removal of impervious area
- ii. The phosphorus source identification report shall be submitted to EPA as part of the year 4 annual report.

c. Potential Structural BMPs

- i. Within five years of the permit effective date, the permittee shall 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 Phosphorus Source Identification Report that are within the drainage area of the water quality limited water or its tributaries. The evaluation shall include:
  1. The next planned infrastructure, resurfacing or redevelopment activity planned for the property (if applicable) OR planned retrofit date;
  2. The estimated cost of redevelopment or retrofit BMPs; and
  3. The engineering and regulatory feasibility of redevelopment or retrofit BMPs.
- ii. The permittee shall provide a listing of planned structural BMPs and a plan and schedule for implementation in the year 5 annual report. The permittee shall plan and install a minimum of one structural BMP as a demonstration project within the drainage area of the water quality limited water or its tributaries within six years of the permit effective date. The demonstration project shall be installed targeting a catchment with high phosphorus load potential. The permittee shall install the

remainder of the structural BMPs in accordance with the plan and schedule provided in the year 5 annual report.

- iii. Any structural BMPs installed in the regulated area by the permittee or its agents shall be tracked and the permittee shall estimate the phosphorus removal by the BMP consistent with Attachment 3 to Appendix F. The permittee shall document the BMP type, total area treated by the BMP, the design storage volume of the BMP and the estimated phosphorus removed in mass per year by the BMP in each annual report.
2. At any time during the permit term the permittee may be relieved of additional requirements in Appendix H part II.1. applicable to it when in compliance with this part.
    - a. The permittee is relieved of its additional requirements as of the date when one of the following criteria are met:
      - i. The receiving water and all downstream segments are determined to no longer be impaired due to phosphorus by MassDEP and EPA concurs with such determination.
      - ii. An EPA approved TMDL for the receiving water or downstream receiving water indicates that no additional stormwater controls for the control of phosphorus are necessary for the permittee's discharge based on wasteload allocations as part of the approved TMDL.
    - b. In such a case, the permittee shall document the date of the determination provided for in paragraph a. above or the approved TMDL date in its SWMP and is relieved of any additional requirements of Appendix H part II.1. as of the applicable date and the permittee shall comply with the following:
      - i. The permittee shall identify in its SWMP all activities that have been implemented in accordance with the requirements of Appendix H part II.1. as of the applicable date to reduce phosphorus in its discharges, including implementation schedules for non structural BMPs and any maintenance requirements for structural BMPs
      - ii. The permittee shall continue to implement all requirements of Appendix H part II.1. required to be done prior to the date of determination or the date of the approved TMDL, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications.

### **III. Discharges to water quality limited waterbodies where bacteria or pathogens is the cause of the impairment**

1. Consistent with part 2.2.2.c.i. of the permit, permittees that discharge to waterbodies that are water quality limited due to bacteria or pathogens, without an EPA approved TMDL, are subject to the following additional requirements to address bacteria or pathogens in their stormwater discharges.
2. Additional or Enhanced BMPs
  - a. The permittee remains subject to the requirements of part 2.3. of the permit and shall include the following enhancements to the BMPs required by part 2.3 of the permit:
    - i. Part 2.3.2. Public Education and outreach: The permittee shall supplement its Residential program with an annual message encouraging the proper management of pet waste, including noting any existing ordinances where appropriate. The permittee or its agents shall disseminate educational materials to dog owners at the time of issuance or renewal of a dog license, or other appropriate time. Education materials shall describe the detrimental impacts of improper management of pet waste, requirements for waste collection and disposal, and penalties for non-compliance. The permittee shall also provide information to owners of septic systems about proper maintenance in any catchment that discharges to a water body impaired for bacteria or pathogens. All public education messages can be combined with requirements of Appendix H part I and II as well as Appendix F part A.III, A.IV, A.V, B.I, B.II and B.III where appropriate.
    - ii. Part 2.3.4 Illicit Discharge: The permittee shall implement the illicit discharge program required by this permit. Catchments draining to any waterbody impaired for bacteria or pathogens shall be designated either Problem Catchments or HIGH priority in implementation of the IDDE program.
3. At any time during the permit term the permittee may be relieved of additional requirements in Appendix H part III.2. applicable to it when in compliance with this part.
  - a. The permittee is relieved of its additional requirements as of the date when one of the following criteria are met:
    - i. The receiving water is determined to be no longer impaired due to bacteria or pathogens by MassDEP and EPA concurs with such a determination.
    - ii. An EPA approved TMDL for the receiving water indicates that no additional stormwater controls are necessary for the control of bacteria or pathogens from the permittee's discharge based on wasteload allocations as part of the approved TMDL.
    - iii. The permittee's discharge is determined to be below applicable water quality criteria<sup>1</sup> and EPA agrees with such a determination. The permittee shall submit data to EPA that accurately characterizes the concentration of bacteria or pathogens in their discharge. The characterization shall include water quality

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<sup>1</sup> Applicable water quality criteria are the state standards that have been federally approved as of the effective date of this permit and are compiled by EPA at <http://www.epa.gov/waterscience/standards/wqslibrary/>

and flow data sufficient to accurately assess the concentration of bacteria or pathogens in all seasons during storm events of multiple sizes and for the duration of the storm events including the first flush, peak storm flow and return to baseflow.

- b. In such a case, the permittee shall document the date of the determination, date of approved TMDL or date of EPA concurrence that the discharge meets water quality criteria in its SWMP and is relieved of any additional requirements of Appendix H part III.2. as of that date and the permittee shall comply with the following:
  - i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix H part III.2. to date to reduce bacteria or pathogens in its discharges, including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
  - ii. The permittee shall continue to implement all requirements of Appendix H part III.3. required to be done prior to the date of determination date, date of approved TMDL, or date of EPA concurrence that the discharge meets water quality criteria, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications

**IV. Discharges to water quality limited waterbodies where chloride is the cause of the impairment**

1. Consistent with part 2.2.2.c.i. of the permit, permittees that discharge to waterbodies that are water quality limited due to chloride, without an EPA approved TMDL, are subject to the following additional requirements to address chloride in their stormwater discharges.
2. Permittees discharging to a waterbody listed as impaired due to chloride in categories 5 or 4b on the Massachusetts Integrated Report of waters listed pursuant to Clean Water Act sections 303(d) and 305(b) shall develop a Salt Reduction Plan that includes specific actions designed to achieve salt reduction on municipal roads and facilities, and on private facilities that discharge to its MS4 in the impaired catchment(s). The Salt Reduction Plan shall be completed within three years of the effective date of the permit and include the BMPs in part IV.4. below. The Salt Reduction Plan shall be fully implemented five years after the effective date of the permit.
3. Permittees that, during the permit term, become aware that their discharge is to a waterbody that is impaired due to chloride must update their Salt Reduction Plan within 60 days of becoming aware of the situation to include salt reduction practices targeted at lowering chloride in discharges to the impaired waterbody. If the permittee does not have a Salt Reduction Plan already in place, then the permittee shall complete a Salt Reduction Plan that includes the BMPs in part IV 4) below within 3 years of becoming aware of the situation and fully implement the Salt Reduction Plan within 5 years of becoming aware of the situation.
4. Additional or Enhanced BMPs
  - a. For municipally maintained surfaces:
    - i. Tracking of the types and amount of salt applied to all permittee owned and maintained surfaces and reporting of salt use beginning in the year of the completion of the Salt Reduction Plan in the permittee's annual reports;
    - ii. Planned activities for salt reduction on municipally owned and maintained surfaces, which shall include but are not limited to the following unless the permittee determines one or more of the following is not applicable to its system and documents that determination as part of the Salt Reduction Plan:
      - Operational changes such as pre-wetting, pre-treating the salt stockpile, increasing plowing prior to de-icing, monitoring of road surface temperature, etc.;
      - Implementation of new or modified equipment providing pre-wetting capability, better calibration rates, or other capability for minimizing salt use;
      - Training for municipal staff and/or contractors engaged in winter maintenance activities;
      - Adoption of guidelines for application rates for roads and parking lots (see *Winter Parking Lot and Sidewalk Maintenance*

*Manual (Revised edition June 2008)*

<http://www.pca.state.mn.us/publications/parkinglotmanual.pdf>;

and the application guidelines on page 17 of *Minnesota Snow and Ice Control: Field Handbook for Snow Operators* (September 2012)

<http://www.mnltap.umn.edu/publications/handbooks/documents/snowice.pdf> for examples );

- Regular calibration of spreading equipment;
- Designation of no-salt and/or low salt zones;
- Measures to prevent exposure of salt stockpiles (if any) to precipitation and runoff; and
- An estimate of the total tonnage of salt reduction expected by each activity.

- b. For privately maintained facilities that discharge to the MS4:
    - i. Establish an ordinance, bylaw, or other regulatory mechanism requiring measures to prevent exposure of any salt stockpiles to precipitation and runoff at all commercial and industrial properties within the regulated area.
    - ii. Part 2.3.2. Public Education and Outreach: The permittee shall supplement its Commercial/Industrial education program with an annual message to private road salt applicators and commercial and industrial site owners on the proper storage and application rates of winter deicing material. The educational materials shall be disseminated in the November/December timeframe and shall describe steps that can be taken to minimize salt use and protect local waterbodies.
    - iii. Part 2.3.6, Stormwater Management in New Development and Redevelopment – establish procedures and requirements to minimize salt usage and require the use of salt alternatives where the permittee deems necessary.
  - c. The completed Salt Reduction Plan shall be submitted to EPA along with the annual report following the Salt Reduction Plan’s completion. Each subsequent annual report shall include an update on Plan implementation progress, any updates to the Salt Reduction Plan deemed necessary by the permittee, as well as the types and amount of salt applied to all permittee owned and maintained surfaces.
5. At any time during the permit term the permittee may be relieved of additional requirements in Appendix H part IV as follows:
- a. The permittee is relieved of its additional requirements as of the date when one of the following criteria are met:
    - i. The receiving water is determined to be no longer impaired due to chloride by MassDEP and EPA concurs with such a determination.
    - ii. An EPA approved TMDL for the receiving water indicates that no additional stormwater controls are necessary for the control of chloride from the

- permittee's discharge based on wasteload allocations as part of the approved TMDL.
- iii. The permittee's discharge is determined to be below applicable water quality criteria<sup>2</sup> and EPA agrees with such a determination. The permittee shall submit data to EPA that accurately characterizes the concentration of chloride in their discharge during the deicing season (November – March). The characterization shall include water quality and flow data sufficient to accurately assess the concentration of chloride in the deicing season during storm events of multiple sizes and for the duration of the storm events including the first flush, peak storm flow and return to baseflow and include samples collected during deicing activities.
  - b. In such a case, the permittee shall document the date of the determination, date of approved TMDL or date of EPA concurrence that the discharge meets water quality criteria in its SWMP and is relieved of any additional requirements of Appendix H part IV as of that date and the permittee shall comply with the following:
    - i. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix H part IV to date to reduce chloride in its discharges, including implementation schedules for non-structural BMPs
    - ii. The permittee shall continue to implement all requirements of Appendix H part IV required to be done by the date of determination date, date of approved TMDL, or date of EPA concurrence that the discharge meets water quality criteria, including ongoing implementation of identified non-structural BMPs

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<sup>2</sup> Applicable water quality criteria are the state standards that have been federally approved as of the effective date of this permit and are compiled by EPA at <http://www.epa.gov/waterscience/standards/wqslibrary/>

**V. Discharges to water quality limited waterbodies and their tributaries where solids, oil and grease (hydrocarbons), or metals is the cause of the impairment**

1. Consistent with part 2.2.2.c.i. of the permit, permittees that discharge to waterbodies that are water quality limited due to solids, metals, or oil and grease (hydrocarbons), without an EPA approved TMDL, are subject to the following additional requirements to address solids, metals, or oil and grease (hydrocarbons) in their stormwater discharges.
2. Additional or Enhanced BMPs
  - a. The permittee remains subject to the requirements of part 2.3. of the permit and shall include the following enhancements to the BMPs required by part 2.3 of the permit:
    - i. Part 2.3.6, Stormwater Management in New Development and Redevelopment: stormwater management systems designed on commercial and industrial land use area draining to the water quality limited waterbody shall incorporate designs that allow for shutdown and containment where appropriate to isolate the system in the event of an emergency spill or other unexpected event. EPA also encourages the permittee to require any stormwater management system designed to infiltrate stormwater on commercial or industrial sites to provide the level of pollutant removal equal to or greater than the level of pollutant removal provided through the use of biofiltration of the same volume of runoff to be infiltrated, prior to infiltration.
    - ii. Part 2.3.7, Good House Keeping and Pollution Prevention for Permittee Owned Operations: increased street sweeping frequency of all municipal owned streets and parking lots to a schedule determined by the permittee to target areas with potential for high pollutant loads. This may include, but is not limited to, increased street sweeping frequency in commercial areas and high density residential areas, or drainage areas with a large amount of impervious area. Prioritize inspection and maintenance for catch basins to ensure that no sump shall be more than 50 percent full. Clean catch basins more frequently if inspection and maintenance activities indicate excessive sediment or debris loadings. Each annual report shall include the street sweeping schedule determined by the permittee to target high pollutant loads.
3. At any time during the permit term the permittee may be relieved of additional requirements in Appendix H part V.2. applicable to it when in compliance with this part.
  - a. The permittee is relieved of its additional requirements as of the date when one of the following criteria are met:
    - i. The receiving water is determined to be no longer impaired due to solids, metals, or oil and grease (hydrocarbons) by MassDEP and EPA concurs with such a determination.
    - ii. An EPA approved TMDL for the receiving water indicates that no additional stormwater controls are necessary for the control of solids, metals, or oil and grease (hydrocarbons) from the permittee's discharge based on wasteload allocations as part of the approved TMDL.

- iii. The permittee's discharge is determined to be below applicable water quality criteria and EPA agrees with such a determination<sup>3</sup>. The permittee shall submit data to EPA that accurately characterizes the concentration of bacteria or pathogens in their discharge. The characterization shall include water quality and flow data sufficient to accurately assess the concentration of bacteria or pathogens in all seasons during storm events of multiple sizes and for the duration of the storm events including the first flush, peak storm flow and return to baseflow.
- b. In such a case, the permittee shall document the date of the determination, date of approved TMDL or date of EPA concurrence that the discharge meets water quality criteria in its SWMP and is relieved of any additional requirements of Appendix H part V.2. as of that date and the permittee shall comply with the following:
  - iv. The permittee shall identify in its SWMP all activities implemented in accordance with the requirements of Appendix H part V.2. to date to reduce solids, metals, or oil and grease (hydrocarbons) in its discharges, including implementation schedules for non-structural BMPs and any maintenance requirements for structural BMPs
  - v. The permittee shall continue to implement all requirements of Appendix H part V.3. required to be done by the date of determination date, date of approved TMDL, or date of EPA concurrence that the discharge meets water quality criteria, including ongoing implementation of identified non-structural BMPs and routine maintenance and replacement of all structural BMPs in accordance with manufacturer or design specifications

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<sup>3</sup> Applicable water quality criteria are the state standards that have been federally approved as of the effective date of this permit and are compiled by EPA at <http://www.epa.gov/waterscience/standards/wqslibrary/>

## ATTACHMENT 1 TO APPENDIX H

The estimates of nitrogen load reductions resulting from BMP installation are intended for informational purposes only and there is no associated permittee-specific required nitrogen load reduction in the Draft Permit. Nitrogen load reduction estimates calculated consistent with the methodologies below may be used by the permittee to comply with future permit requirements providing the EPA determines the calculated reductions are appropriate for demonstrating compliance with future permit requirements. This attachment provides the method and an example to calculate the BMP nitrogen load as well as methods to calculate nitrogen load reductions for structural BMPs in an impaired watershed.

### **BMP N Load:**

The **BMP N Load** is the annual nitrogen load from the drainage area to each proposed or existing BMP used by permittee. This measure is used to estimate the amount of annual nitrogen load that the BMP will receive or treat (BMP N Load).

To calculate the BMP N Load for a given BMP:

- 1) Determine the total drainage area to the BMP and sort the total drainage area into two categories: total impervious area (IA) and total pervious area (PA);
- 2) Calculate the nitrogen load associated with impervious area (N Load<sub>IA</sub>) and the pervious area (N Load<sub>PA</sub>) by multiplying the IA and PA by the appropriate land use-based nitrogen load export rate provided in Table 1; and
- 3) Determine the total nitrogen load to the BMP by summing the calculated impervious and pervious subarea nitrogen loads.

**Table 1: Annual nitrogen load export rates**

Nitrogen Source Category by Land Use	Land Surface Cover	Nitrogen Load Export Rate, lbs/ac/yr	Nitrogen Load Export Rate, kg/ha/yr
All Impervious Cover	Impervious	14.1	15.8
*Developed Land Pervious (DevPERV)- HSG A	Pervious	0.3	0.3
*Developed Land Pervious (DevPERV)- HSG B	Pervious	1.2	1.3
*Developed Land Pervious (DevPERV) – HSG C	Pervious	2.4	2.7
*Developed Land Pervious (DevPERV) - HSG C/D	Pervious	3.0	3.4
*Developed Land Pervious (DevPERV) - HSG D	Pervious	3.7	4.1
Notes: For pervious areas, if the hydrologic soil group (HSG) is known, use the appropriate value from this table. If the HSG is not known, assume HSG C/D conditions for the nitrogen load export rate.			

**Example 1 to determine nitrogen load to a proposed BMP when the contributing drainage area is 100% impervious:** A permittee is proposing a storm water infiltration system that will treat runoff from 1.49 acres of impervious area.

**Table 1-1: Design parameters for Bio-filtration w/ ISR systems for Example 1**

Components of representation	Parameters	Value
<b>Ponding</b>	Maximum depth	0.33 ft
	Surface area	645 ft <sup>2</sup>
<b>Soil mix</b>	Depth	2.0 ft
	Porosity	0.24
	Hydraulic conductivity	2.5 inches/hour
<b>Stone Reservoir (ISR)</b>	Depth	2.50 ft
	Porosity	0.42
	Hydraulic conductivity	500 inches/hour
<b>ISR Volume: System Storage Volume</b>	Ratio	0.56
<b>Orifices</b>	Diameter	12 in
		Installed 2.5 above impermeable soil layer

Determine:

- A) Percent nitrogen load reduction (BMP Reduction %-N) for the specified bio-filtration w/ISR system and contributing impervious drainage area; and
- B) Nitrogen reduction in pounds that would be accomplished by the bio-filtration w/ISR system (BMP-Reduction lbs-N)

**Solution:**

- 1) The BMP is a bio-filtration w/ISR system that will treat runoff from 1.49 acres of impervious area (IA = 1.49 acre);
- 2) The available storage volume capacity (ft<sup>3</sup>) of the bio-filtration w/ISR system (BMP-Volume<sub>BMP-ft<sup>3</sup></sub>) is determined using the surface area of the system, depth of ponding, the porosity of the filter media and the porosity of the stone reservoir:

$$\begin{aligned}
 \text{BMP-Volume}_{\text{BMP-ft}^3} &= \text{Surface area} \times (\text{pond maximum depth} + (\text{soil mix depth} \times \text{soil mix porosity}) + \text{stone reservoir depth} \times \text{gravel layer porosity}) \\
 &= 520 \text{ ft}^2 \times (0.33 \text{ ft} + (2.0 \text{ ft} \times 0.24) + (2.5 \text{ ft} \times 0.42)) \\
 &= 1,200 \text{ ft}^3
 \end{aligned}$$

- 3) The available storage volume capacity of the bio-filtration w/ISR system in inches of runoff from the contributing impervious area (BMP-Volume<sub>IA-in</sub>) is calculated using equation 1:

$$\text{BMP-Volume}_{\text{IA-in}} = (\text{BMP-Volume}_{\text{ft}^3} / \text{IA (acre)} \times 12 \text{ in/ft} \times 1 \text{ acre} / 43560 \text{ ft}^2) \text{ (Equation 1)}$$

**Example 1 Continued:**

$$\begin{aligned} \text{BMP-Volume}_{\text{IA-in}} &= (1,200 \text{ ft}^3/1.49 \text{ acre}) \times 12 \text{ in/ft} \times 1 \text{ acre}/43560 \text{ ft}^2 \\ &= \mathbf{0.22 \text{ in}} \end{aligned}$$

- 4) Using the Regional Performance Curve shown in Figure 1 for a bio-filtration w/ ISR system, a **61%** nitrogen load reduction (BMP Reduction %-N) is determined for a bio-filtration w/ ISR systems sized for 0.22 in of runoff from 1.49 acres of impervious area; and
- 5) Calculate the nitrogen load reduction in pounds of nitrogen for the bio-filtration w/ISR system (BMP Reduction  $\text{lbs-N}$ ) using the BMP Load calculation method shown above in Example 1 and the BMP Reduction %-N determined in step 4 by using equation 2.

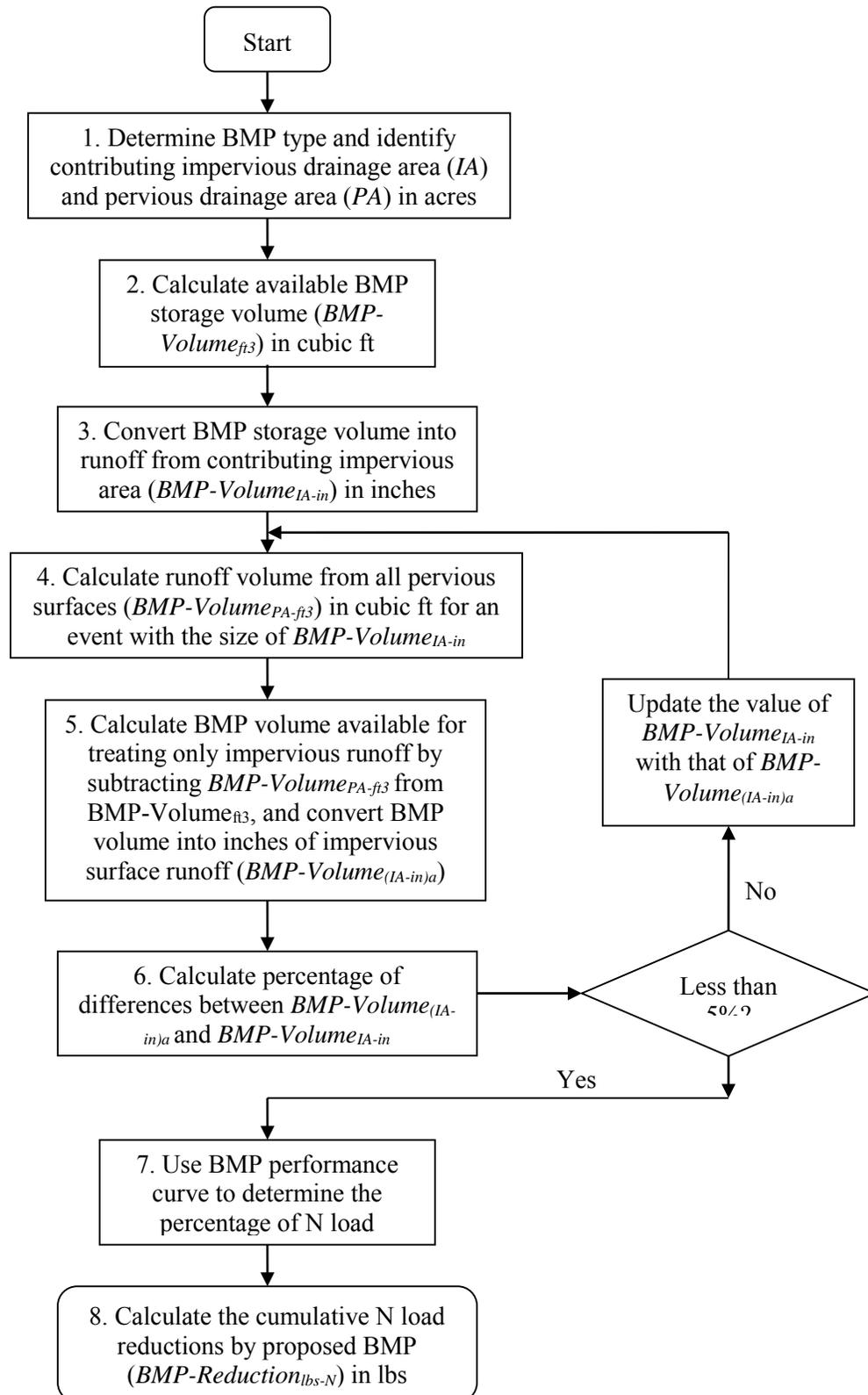
First, the BMP Load is determined as specified in Example 1:

$$\begin{aligned} \text{BMP Load} &= \text{IA (acre)} \times 14.1 \text{ lb/ac/yr} \\ &= 1.49 \text{ acres} \times 14.1 \text{ lbs/acre/yr} \\ &= 21.0 \text{ lbs/yr} \end{aligned}$$

$$\text{BMP Reduction}_{\text{lbs-N}} = \text{BMP Load} \times (\text{BMP Reduction } \%-N/100) \text{ (Equation 2)}$$

$$\begin{aligned} \text{BMP Reduction}_{\text{lbs-N}} &= 21 \text{ lbs/yr} \times (61/100) \\ &= \mathbf{12.8 \text{ lbs/yr}} \end{aligned}$$

**Method to determine the nitrogen load reduction for a structural BMP with a known storage volume when the contributing drainage area has impervious and pervious surfaces**



**Flow Chart 2 (previous page). Method to determine the nitrogen load reduction for a BMP with known storage volume when both pervious and impervious drainage areas are present.**

- 1) Identify the type of structural BMP and characterize the contributing drainage area to the structural BMP by identifying the following information for the impervious and pervious surfaces:

**Impervious area (IA)** – Area (acre) and export rate (Table 1)

**Pervious area (PA)** – Area (acre) and runoff depth based on hydrologic soil group (HSG) and size of rainfall event. Table 2 provides values of runoff depth for various rainfall depths and HSGs. Soils are assigned to an HSG based on their permeability. HSG categories for pervious areas in the Watershed shall be estimated by consulting local soil surveys prepared by the National Resource Conservation Service (NRCS) or by a storm water professional evaluating soil testing results from the Watershed. If the HSG condition is not known, a HSG D soil condition should be assumed.

**Table 2: Developed Land Pervious Area Runoff Depths  
based on Precipitation depth and Hydrological Soil Groups (HSGs)**

Rainfall Depth, Inches	Runoff Depth, inches		
	Pervious HSG A/B	Pervious HSG C	Pervious HSG D
0.10	0.00	0.00	0.00
0.20	0.00	0.01	0.02
0.40	0.00	0.03	0.06
0.50	0.00	0.05	0.09
0.60	0.01	0.06	0.11
0.80	0.02	0.09	0.16
1.00	0.03	0.12	0.21
1.20	0.04	0.14	0.39
1.50	0.11	0.39	0.72
2.00	0.24	0.69	1.08

Notes: Runoff depths derived from combination of volumetric runoff coefficients from Table 5 of *Small Storm Hydrology and Why it is Important for the Design of Stormwater Control Practices*, Pitt, 1999 and using the Stormwater Management Model (SWMM) in continuous model mode for hourly precipitation data for Boston, MA, 1998-2002.

- 2) Determine the available storage volume ( $\text{ft}^3$ ) of the structural BMP (BMP-Volume  $\text{ft}^3$ ) using the BMP dimensions and design specifications (e.g., maximum storage depth, filter media porosity);

- 3) To estimate the nitrogen load reduction of a BMP with a known storage volume capacity, it is first necessary to determine the portion of available BMP storage capacity (BMP-Volume<sub>ft<sup>3</sup></sub>) that would treat the runoff volume generated from the contributing impervious area (IA) for a rainfall event with a depth of *i* inches (in). This will require knowing the corresponding amount of runoff volume that would be generated from the contributing pervious area (PA) for the same rainfall event (depth of *i* inches). Using equation 3 below, solve for the BMP capacity that would be available to treat runoff from the contributing impervious area for the unknown rainfall depth of *i* inches (see equation 4):

$$\text{BMP-Volume}_{\text{ft}^3} = \text{BMP-Volume}_{(\text{IA-ft}^3)_i} + \text{BMP-Volume}_{(\text{PA-ft}^3)_i} \quad \text{(Equation 3)}$$

Where:

BMP-Volume<sub>ft<sup>3</sup></sub> = the available storage volume of the BMP  
 BMP-Volume<sub>(IA-ft<sup>3</sup>)<sub>i</sub></sub> = the available storage volume of the BMP that would fully treat runoff generated from the contributing impervious area for a rainfall event of size *i* inches  
 BMP-Volume<sub>(PA-ft<sup>3</sup>)<sub>i</sub></sub> = the available storage volume of the BMP that would fully treat runoff generated from the contributing pervious area for a rainfall event of size *i* inches

Solving for BMP-Volume<sub>(IA-ft<sup>3</sup>)<sub>i</sub></sub>:

$$\text{BMP-Volume}_{(\text{IA-ft}^3)_i} = \text{BMP-Volume}_{\text{ft}^3} - \text{BMP-Volume}_{(\text{PA-ft}^3)_i} \quad \text{(Equation 4)}$$

To determine BMP-Volume<sub>(IA-ft<sup>3</sup>)<sub>i</sub></sub>, requires performing an iterative process of refining estimates of the rainfall depth used to calculate runoff volumes until the rainfall depth used results in the sum of runoff volumes from the contributing IA and PA equaling the available BMP storage capacity (BMP-Volume<sub>ft<sup>3</sup></sub>). For the purpose of estimating BMP performance, it will be considered adequate when the IA runoff depth (in) is within 5% IA runoff depth used in the previous iteration.

For the first iteration (1), convert the BMP-Volume<sub>ft<sup>3</sup></sub> determined in step 2 into inches of runoff from the contributing impervious area (BMP Volume<sub>(IA-in)<sub>1</sub></sub>) using equation 5.

$$\text{BMP-Volume}_{(\text{IA-in})_1} = (\text{BMP-Volume}_{\text{ft}^3} / \text{IA (acre)}) \times (12 \text{ in/ft} / 43,560 \text{ ft}^2/\text{acre}) \quad \text{(Equation 5)}$$

For iterations 2 through *n* (2...*n*), convert the BMP Volume<sub>(IA-ft<sup>3</sup>)<sub>2...n</sub></sub>, determined in step 5a below, into inches of runoff from the contributing impervious area (BMP Volume<sub>(IA-in)<sub>2...n</sub></sub>) using equation 6.

$$\text{BMP-Volume}_{(\text{IA-in})_{2...n}} = (\text{BMP-Volume}_{(\text{IA-ft}^3)_{2...n}} / \text{IA (acre)}) \times (12 \text{ in/ft} / 43,560 \text{ ft}^2/\text{acre}) \quad \text{(Equation 6)}$$

- 4) For 1 to *n* iterations, use the pervious runoff depth information from Table 2 and equation 7 to determine the total volume of runoff (ft<sup>3</sup>) from the contributing PA (BMP Volume

$_{PA-ft^3}$ ) for a rainfall size equal to the sum of BMP-Volume  $_{(IA-in)1}$ , determined in step 3. The runoff volume for each distinct pervious area must be determined.

$$\text{BMP Volume }_{(PA-ft^3)1..n} = \sum ((PA \times (\text{runoff depth})_{(PA1, PA2..PAN)}) \times (3,630 \text{ ft}^3/\text{acre-in}))$$

**(Equation 7)**

- 5) For iteration 1, estimate the portion of BMP Volume that is available to treat runoff from only the IA by subtracting BMP-Volume  $_{PA-ft^3}$ , determined in step 4, from BMP-Volume  $_{ft^3}$ , determined in step 2, and convert to inches of runoff from IA (see equations 8 and 9):

$$\text{BMP-Volume }_{(IA-ft^3)2} = ((\text{BMP-Volume}_{ft^3} - \text{BMP Volume }_{(PA-ft^3)1}) \quad \text{(Equation 8)}$$

$$\text{BMP-Volume }_{(IA-in)2} = (\text{BMP-Volume }_{(IA-ft^3)2}/\text{IA (acre)}) \times (12 \text{ in/ft} \times 1 \text{ acre}/43,560 \text{ ft}^2)$$

**(Equation 9)**

If additional iterations (i.e., 2 through n) are needed, estimate the portion of BMP volume that is available to treat runoff from only the IA (BMP-Volume  $_{(IA-in)3..n+1}$ ) by subtracting BMP Volume  $_{(PA-ft^3)2..n}$ , determined in step 4, from BMP Volume  $_{(IA-ft^3)3..n+1}$ , determined in step 5, and by converting to inches of runoff from IA using equation 9):

- 6) For iteration A (an iteration between 1 and n+1), compare BMP Volume  $_{(IA-in)a}$  to BMP Volume  $_{(IA-in)a-1}$  determined from the previous iteration (a-1). If the difference in these values is greater than 5% of BMP Volume  $_{(IA-in)a}$  then repeat steps 4 and 5, using BMP Volume  $_{(IA-in)a}$  as the new starting value for the next iteration (a+1). If the difference is less than or equal to 5 % of BMP Volume  $_{(IA-in)a}$  then the permittee may proceed to step 7.
- 7) Determine the % nitrogen load reduction for the structural BMP (BMP Reduction  $_{\%N}$ ) using the appropriate BMP curve on Figure 1 or 2 and the BMP-Volume  $_{(IA-in)n}$  calculated in the final iteration of step 5; and
- 8) Calculate the nitrogen load reduction in pounds of nitrogen for the structural BMP (BMP Reduction  $_{lbs-N}$ ) using the BMP Load as calculated above in Example 1 and the percent nitrogen load reduction (BMP Reduction  $_{\%N}$ ) determined in step 7 by using equation 10:

$$\text{BMP Reduction }_{lbs-N} = \text{BMP Load} \times (\text{BMP Reduction }_{\%N}/100) \quad \text{(Equation 10)}$$

**Example 2: Determine the nitrogen load reduction for a structural BMP with a known design volume when the contributing drainage area has impervious and pervious surfaces**

A permittee is considering an infiltration basin to capture and treat runoff from a portion of the Watershed draining to the impaired waterbody. The contributing drainage area is 16.55 acres and is 71% impervious. The pervious drainage area (PA) is 80% HSG D and 20% HSG C. An infiltration basin with the following specifications can be placed at the down-gradient end of the contributing drainage area where soil testing results indicates an infiltration rate (IR) of 0.28 in/hr:

**Example continued:**

Structure	Bottom area (acre)	Top surface area (acre)	Maximum pond depth (ft)	Design storage volume (ft <sup>3</sup> )	Infiltration Rate (in/hr)
Infiltration basin	0.65	0.69	1.65	48,155	0.28

Determine the:

- A) Percent nitrogen load reduction (BMP Reduction %<sub>-N</sub>) for the specified infiltration basin and the contributing impervious and pervious drainage area; and
- B) Nitrogen reduction in pounds that would be accomplished by the BMP (BMP-Reduction lbs<sub>-N</sub>)

**Solution:**

- 1) A surface infiltration basin is being considered. Information for the contributing impervious (IA) and pervious (PA) areas are summarized in below.

**Impervious area characteristics**

ID	% Impervious	Area (acre)
IA1	100	11.75

**Pervious area characteristics**

ID	Area (acre)	Hydrologic Soil Group (HSG)
PA1	3.84	D
PA2	0.96	C

- 2) The available storage volume (ft<sup>3</sup>) of the infiltration basin (BMP-Volume ft<sup>3</sup>) is determined from the design details and basin dimensions; BMP-Volume ft<sup>3</sup> = 48,155 ft<sup>3</sup>.
- 3) To determine what the BMP design storage volume is in terms of runoff depth (in) from IA, an iterative process is undertaken:

**Solution Iteration 1**

For the first iteration (1), the BMP-Volume ft<sup>3</sup> is converted into inches of runoff from the contributing impervious area (BMP Volume (IA-in)<sub>1</sub>) using equation 5.

$$\begin{aligned} \text{BMP Volume (IA-in)}_1 &= (48,155 \text{ ft}^3 / 11.75 \text{ acre}) \times (12 \text{ in/ft} / 43,560 \text{ ft}^2/\text{acre}) \\ &= 1.13 \text{ in} \end{aligned}$$

**Solution Continued:**

**4-1)** The total volume of runoff (ft<sup>3</sup>) from the contributing PA (BMP Volume  $_{(PA-ft^3)}$ ) for a rainfall size equal to the sum of BMP Volume  $_{(IA-in)1}$  determined in step 3 is determined

for each distinct pervious area using the information from Table 2 and equation 7.

Interpolation was used to determine runoff depths.

$$\begin{aligned} \text{BMP Volume }_{(PA-ft^3)}1 &= ((3.84 \text{ acre} \times (0.33 \text{ in}) + (0.96 \text{ acre} \times (0.13 \text{ in})) \times 3,630 \text{ ft}^3/\text{acre-in}) \\ &= 5052 \text{ ft}^3 \end{aligned}$$

**5-1)** For iteration 1, the portion of BMP Volume that is available to treat runoff from only the IA is estimated by subtracting the BMP Volume  $_{(PA-ft^3)}1$ , determined in step 4-1, from BMP Volume $_{ft^3}$ , determined in step 2, and converted to inches of runoff from IA:

$$\begin{aligned} \text{BMP Volume }_{(IA-ft^3)}2 &= 48,155 \text{ ft}^3 - 5052 \text{ ft}^3 \\ &= 43,103 \text{ ft}^3 \end{aligned}$$

$$\begin{aligned} \text{BMP Volume }_{(IA-in)}2 &= (43,103 \text{ ft}^3/11.75 \text{ acre}) \times (12 \text{ in/ft} \times 1 \text{ acre}/43,560 \text{ ft}^2) \\ &= 1.01 \text{ in} \end{aligned}$$

**6-1)** The % difference between BMP Volume  $_{(IA-in)}2$ , 1.01 in, and BMP Volume  $_{(IA-in)1}$ , 1.13 in is determined and found to be significantly greater than 5%:

$$\begin{aligned} \% \text{ Difference} &= ((1.13 \text{ in} - 1.01 \text{ in})/1.01 \text{ in}) \times 100 \\ &= 12\% \end{aligned}$$

Therefore, steps 4 through 6 are repeated starting with BMP Volume  $_{(IA-in)}2 = 1.01 \text{ in}$ .

**Solution Iteration 2**

$$\begin{aligned} \text{4-2) BMP-Volume }_{(PA-ft^3)}2 &= ((3.84 \text{ acre} \times 0.21 \text{ in}) + (0.96 \text{ acre} \times 0.12 \text{ in})) \times 3,630 \text{ ft}^3/\text{acre-in} \\ &= 3,358 \text{ ft}^3 \end{aligned}$$

$$\begin{aligned} \text{5-2) BMP-Volume }_{(IA-ft^3)}3 &= 48,155 \text{ ft}^3 - 3,358 \text{ ft}^3 \\ &= 44,797 \text{ ft}^3 \end{aligned}$$

$$\begin{aligned} \text{BMP-Volume }_{(IA-in)}3 &= (44,797 \text{ ft}^3/11.75 \text{ acre}) \times (12 \text{ in/ft} \times 1 \text{ acre}/43,560 \text{ ft}^2) \\ &= 1.05 \text{ in} \end{aligned}$$

$$\begin{aligned} \text{6-2) \% Difference} &= ((1.05 \text{ in} - 1.01 \text{ in})/1.05 \text{ in}) \times 100 \\ &= 4\% \end{aligned}$$

The difference of 4% is acceptable.

**Solution Continued:**

- 7) The % nitrogen load reduction for the infiltration basin (BMP Reduction %-N) is determined by using the RR treatment curve in Figure 2 and the treatment volume (BMP-Volume<sub>Net IA-in</sub> = 1.05 in) calculated in step 5-2 and is **BMP Reduction %-N = 56%**.
- 9) The nitrogen load reduction in pounds of nitrogen (BMP-Reduction<sub>lbs-N</sub>) for the proposed infiltration basin is calculated by using equation 11 with the BMP Load (as determined by the procedure in Example 4-1) and the N<sub>target</sub> of 56%.

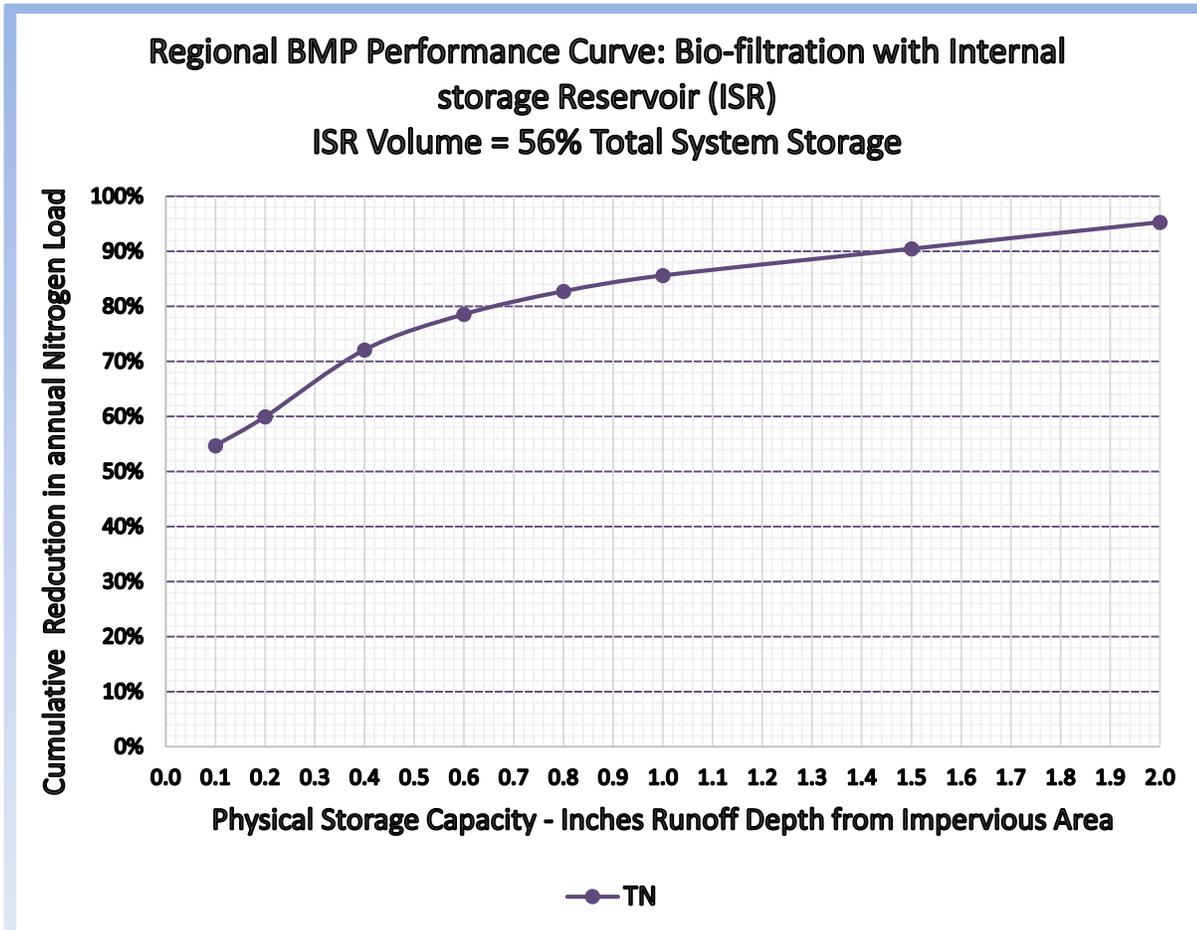
$$\text{BMP-Reduction}_{\text{lbs-N}} = \text{BMP N Load} \times (\text{N}_{\text{target}} / 100) \quad \text{(Equation 11)}$$

Following example 1, the BMP load is calculated:

$$\begin{aligned} \text{BMP N Load} &= (\text{IA} \times \text{impervious cover nitrogen export loading rate}) \\ &\quad + (\text{PA}_{\text{HSG D}} \times \text{pervious cover nitrogen export loading rate, HSG D}) \\ &\quad + (\text{PA}_{\text{HSG C}} \times \text{pervious cover nitrogen export loading rate, HSG C}) \\ &= (16.55 \text{ acre} \times 15.4 \text{ lbs/acre/yr}) + (3.84 \text{ acre} \times 3.7 \text{ lbs/acre/yr}) + \\ &\quad (0.96 \text{ acre} \times 2.4 \text{ lbs/acre/yr}) \\ &= 271.4 \text{ lbs/yr} \end{aligned}$$

$$\text{BMP-Reduction}_{\text{lbs-N}} = 275.13 \text{ lbs/yr} \times 56/100 = \mathbf{152.0 \text{ lbs/yr}}$$

**Figure 1: Regional BMP Performance Curve for Annual Nitrogen Load Removal: System Design by the University of New Hampshire Stormwater Center (UNHSWC)**

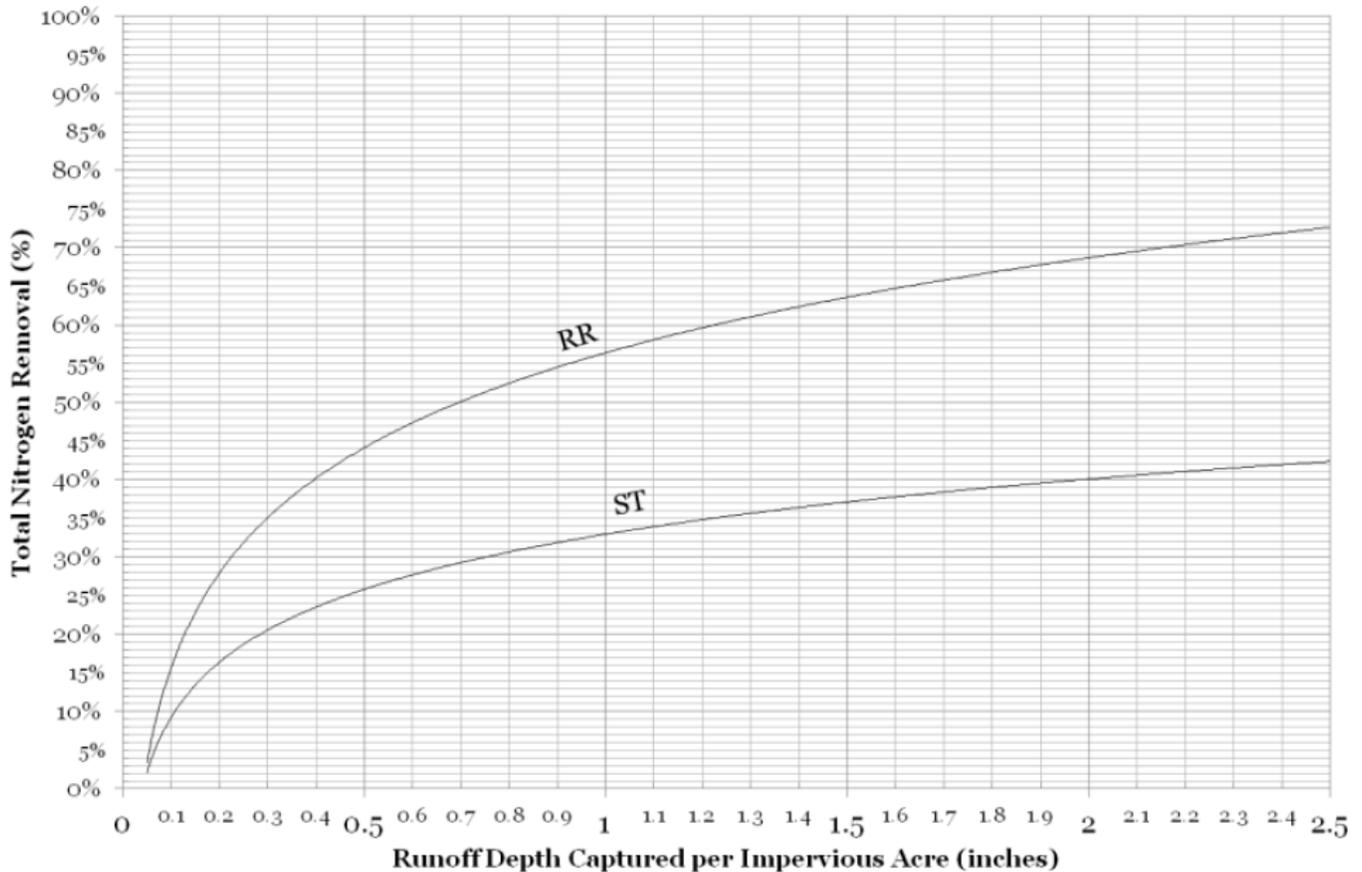


**Table 3. Classification of BMP to Determine Nitrogen Reduction<sup>1</sup>**

Structural BMP	Classification
Infiltration Trench	Runoff Reduction (RR)
Infiltration Basin or other surface infiltration practice	Runoff Reduction (RR)
Bioretention Practice	Runoff Reduction (RR)
Gravel Wetland System	Stormwater Treatment (ST)
Porous Pavement	Runoff Reduction (RR)
Wet Pond or wet detention basin	Stormwater Treatment (ST)
Dry Pond or detention basin	Runoff Reduction (RR)
Water Quality Swale	Runoff Reduction (RR)

<sup>1</sup>Recommendations of the Expert Panel to Define Removal Rates for New State Stormwater Performance Standards  
<http://chesapeakestormwater.net/wp-content/plugins/download-monitor/download.php?id=25>, Retrieved 12/14/2012

**Figure 2: Total Nitrogen Removal for RR and ST Practices**



Adopted from: Final CBP Approved Expert Panel Report on Stormwater Retrofits  
<http://chesapeakestormwater.net/wp-content/plugins/download-monitor/download.php?id=25>, Retrieved 12/14/2012

## APPENDIX D

2016 MS4 Notice of Intent

Part I: General Conditions

**General Information**

Name of Municipality or Organization:  State:

EPA NPDES Permit Number (if applicable):

**Primary MS4 Program Manager Contact Information**

Name:  Title:

Street Address Line 1:

Street Address Line 2:

City:  State:  Zip Code:

Email:  Phone Number:

Fax Number:

**Other Information**

Stormwater Management Program (SWMP) Location

**Eligibility Determination**

Endangered Species Act (ESA) Determination Complete?  Eligibility Criteria (check all that apply):  A  B  C

National Historic Preservation Act (NHPA) Determination Complete?  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

**MS4 Infrastructure** (if covered under the 2003 permit)

**Estimated Percent of Outfall Map Complete?**  If 100% of 2003 requirements not met, enter an estimated date of completion (MM/DD/YY):

Web address where MS4 map is published:

*If outfall map is unavailable on the internet an electronic or paper copy of the outfall map must be included with NOI submission (see section V for submission options)*

**Regulatory Authorities** (if covered under the 2003 permit)

<b>Illicit Discharge Detection and Elimination (IDDE) Authority Adopted?</b> <i>(Part II, III, IV or V, Subpart B.3.(b.) of 2003 permit)</i>	<input type="text" value="Yes"/>	Effective Date or Estimated Date of Adoption (MM/DD/YY):	<input type="text" value="05/03/08"/>
<b>Construction/Erosion and Sediment Control (ESC) Authority Adopted?</b> <i>(Part II,III,IV or V, Subpart B.4.(a.) of 2003 permit)</i>	<input type="text" value="Yes"/>	Effective Date or Estimated Date of Adoption (MM/DD/YY):	<input type="text" value="03/03/09"/>
<b>Post- Construction Stormwater Management Adopted?</b> <i>(Part II, III, IV or V, Subpart B.5.(a.) of 2003 permit)</i>	<input type="text" value="Yes"/>	Effective Date or Estimated Date of Adoption (MM/DD/YY):	<input type="text" value="03/03/09"/>

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

### Part II: Summary of Receiving Waters

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

Check off relevant pollutants for discharges to impaired waterbodies (see above 303(d) lists) without an approved TMDL in accordance with part 2.2.2.a of the permit. List any other pollutants in the last column, if applicable.

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
Wenham Lake (MA92073)	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DDT, Mercury in Fish Tissue
Pleasant Pond (MA92049)	7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Mercury in Fish Tissue
Longham Reservoir (MA92030)	35	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Miles River (MA92-03)	5	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Aquatic Macroinvertebrate Bioassessments, Fecal Coliform
Valley Road Swamp	13	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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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 an 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 requires a target audience). **Use the drop-down menus in each table or enter your own text to override the drop down menu.**

#### MCM 1: Public Education and Outreach

<b>BMP Media/Category</b> (enter your own text to override the drop down menu)	<b>BMP Description</b>	<b>Targeted Audience</b>	<b>Responsible Department/Parties</b> (enter your own text to override the drop down menu)	<b>Measurable Goal</b>	<b>Beginning Year of BMP Implementation</b>
Brochures/Pamphlets	Brochure will consist of 'how-to-guide' for residents on how rain gardens work and how to install them at their home.	Residents	Greenscapes North Shore Coalition	-Number distributed -Resident testimonials	FY2019
Workshop/Info Sheet	Workshop and associated literature will cover LID options for reducing runoff and promoting on-site infiltration. Pricing, maintenance and ordinances will also be discussed.	Developers (construction)	Greenscapes North Shore Coalition and Planning	-Number of attendees -Increase in LID use	FY2019

Brochures/Pamphlets	Brochure will include general info on LIDs that can assist in stormwater management and pollution prevention. Content will be targeted to "environmental contacts" at industrial facilities, or property managers where applicable.	Industrial Facilities	Greenscapes North Shore Coalition	-Number distributed -Phone call followup	FY2020
Workshop	Waterworks presentation will discuss specific BMPs for parking lots; how to reduce impervious surfaces, and maintain the space more sustainably.	Business, Institutions and Commercial Facilities	Greenscapes North Shore Coalition and Planning	-Number of attendees -Number of presentations redistributed to commercial representatives	FY2020
Workshop	Workshop and literature will go into greater detail, following the workshop regarding low impact development held in year one. Town bylaws and associated incentives will be outlined.	Developers (construction)	Greenscapes North Shore Coalition and Planning	-Number of attendees	FY2021

Meeting/Presentation	Presentation will discuss proper "greenscaping" practices on a business/commercial level. Content will be targeted to property managers and will include salt/sand storage and landscape management.	Business, Institutions and Commercial Facilities	Greenscapes North Shore Coalition and Planning	-Number of attendees	FY2022
Meeting/Presentation	Presentation will discuss proper "greenscaping" practices on an industrial level. Content will be targeted to property managers and will include salt/sand storage and landscape management.	Industrial Facilities	Greenscapes North Shore Coalition	-Number of attendees	FY2022
Meeting/Presentation	Greenscapes NS will conduct a "Greenscapes 101" presentation for residents. Presentation will discuss the importance of clean and plentiful water.	Residents	Greenscapes North Shore Coalition and Planning	-Number of attendees -Resident Testimonials	FY2023



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

### Part III: Stormwater Management Program Summary *(continued)*

#### MCM 2: Public Involvement and Participation

<b>BMP Categorization</b>	<b>Brief BMP Description</b> <small>(enter your own text to override the drop down menu)</small>	<b>Responsible Department/Parties</b> <small>(enter your own text to override the drop down menu)</small>	<b>Additional Description/ Measurable Goal</b>	<b>Beginning Year of BMP Imple- mentation</b>
Public Review	SWMP Review	DPW Operations	Allow for public review of the SWMP annually. Post the SWMP and Annual Reports on the Town's website and/or make them available at Town Hall.	FY2019
Public Participation	Household hazardous waste collection	DPW Operations	Continue to hold an annual household hazardous waste drop off day for residents. Track number of residents that participate and amount and types of materials collected.	FY2019
Public Participation	Community Clean-up	DPW Operations	Continue to provide support to community clean-up activities held by Gordon College, the local boy scouts and Audubon groups. Track number of participants, material collected and support provided.	FY2019
Public Participation	Maintain stormwater hotline	DPW Operations	Continue to inform residents of the proper town offices to contact if they need information or to report problems dealing with stormwater issues. Maintain logs with information on the calls received and the actions/responses performed.	FY2019



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

### Part III: Stormwater Management Program Summary (continued)

#### MCM 3: Illicit Discharge Detection and Elimination (IDDE)

<b>BMP Categorization</b> (enter your own text to override the drop down menu)	<b>BMP Description</b>	<b>Responsible Department/Parties</b> (enter your own text to override the drop down menu)	<b>Measurable Goal</b> (all text can be overwritten)	<b>Beginning Year of BMP Implementation</b>
SSO inventory	The Town does not have any municipally owned or maintained sanitary sewers in Town so this BMP is not applicable.	N/A	N/A	
Update GIS drainage Map	Update drainage map in accordance with permit conditions and update annually during IDDE program implementation.	DPW Operations	Update map within 2 years of effective date of permit and complete full system map 10 years after effective date of permit. Report on progress annually.	FY2020
Written IDDE program	Create written IDDE program to meet permit conditions.	DPW Operations	Complete within 1 year of the effective date of permit and update as required	FY2019
Implement IDDE program	Implement catchment investigations according to program and permit conditions	DPW Operations	Begin within two years of permit effective date, and complete 10 years after effective date of permit. Track annually the number of illicit connections that are identified and removed.	FY2020
Employee training	Train employees on IDDE program components and implementation.	Health Department	Provide training to municipal employees annually. Track the number of employees that receive training.	FY2019
Conduct dry weather screening and sampling	Conduct in accordance with outfall screening procedure and permit conditions	DPW Operations	Complete within 3 years of permit effective date. Track number of outfalls that are screened and sampled annually.	FY2021

Conduct wet weather screening	Conduct wet weather screening and sampling at outfalls/ interconnections in catchments where System Vulnerability Factors are present in accordance with permit conditions.	DPW Operations	Complete within 10 years of permit effective date. Track number of outfalls that are screened and sampled annually.	FY2022
Ongoing screening	Conduct dry weather and wet weather screening (as necessary)	DPW Operations	Complete ongoing outfall screening upon completion of IDDE investigations.	FY2029
Priority Ranking	Assess and rank the potential for all catchments to have illicit discharges. Identify catchments with System Vulnerability Factors that will necessitate wet weather sampling.	DPW Operations	Complete within 1 year of permit effective date.	FY2019
Follow-up Ranking	Update catchment prioritization and ranking as dry weather screening information becomes available.	DPW Operations	Complete within 3 years of permit effective date.	FY2021
Catchment Investigation Procedures	Develop written catchment investigation procedures and incorporate into IDDE Plan.	DPW Operations	Complete within 18 months of permit effective date.	FY2019



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

### Part III: Stormwater Management Program Summary *(continued)*

#### MCM 4: Construction Site Stormwater Runoff Control

<b>BMP Categorization</b> (enter your own text to override the drop down menu or entered text)	<b>BMP Description</b>	<b>Responsible Department/Parties</b> (enter your own text to override the drop down menu)	<b>Measurable Goal</b> (all text can be overwritten)	<b>Beginning Year of BMP Implementation</b>
Site inspection and enforcement of Erosion and Sediment Control (ESC) measures	Develop written procedures for site inspections and enforcement.	DPW Operations/Planning Dept.	Complete within 1 year of the effective date of permit. Report on the number of site inspections and enforcement actions annually.	FY2019
Site plan review	Develop written procedures for site plan review that meet permit requirements and begin implementation.	DPW Operations	Complete within 1 year of the effective date of permit. Report on the number of site plan reviews conducted, inspections conducted, and enforcement actions taken annually.	FY2019
Erosion and Sediment Control	Continue to require construction operators to implement a sediment and erosion control program and enhance program as needed to meet permit requirements. Review and update existing regulations as needed to ensure that construction operators implement a sediment and erosion control program that includes BMPs that are appropriate for conditions at the construction site in accordance with permit requirements.	DPW Operations/ Planning Dept.	Complete within 1 year of the effective date of permit.	FY2019



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

### Part III: Stormwater Management Program Summary (continued)

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

<b>BMP Categorization</b> (enter your own text to override the drop down menu or entered text)	<b>BMP Description</b>	<b>Responsible Department/Parties</b> (enter your own text to override the drop down menu)	<b>Measurable Goal</b> (all text can be overwritten)	<b>Beginning Year of BMP Implementation</b>
As-built plans for on-site stormwater control	Update existing procedures to require submission of as-built drawings within 2 years of completion of construction and ensure long term operation and maintenance.	Planning/ DPW Operations	Require submission of as-built plans and long term O&M for completed projects. Complete within 2 years of permit effective date.	FY2020
Target & rank properties for BMP retrofitting	Identify at least 5 permittee-owned properties that could be modified or retrofitted with BMPs to reduce frequency, volume, and pollutant loads associated with stormwater discharges, and update annually.	DPW Operations	Complete 4 years after effective date of permit and report annually on retrofitted properties.	FY2022
Allow green infrastructure practices	Develop a report assessing existing local regulations to determine the feasibility of making green infrastructure practices allowable when appropriate site conditions exist.	Planning/ DPW Operations	Complete 4 years after effective date of permit and implement recommendations of report, where feasible.	FY2022

Street design and parking lot guidelines	Develop a report assessing requirements that affect the creation of impervious cover to determine if changes to design standards for streets and parking lots can be modified to support low impact design options.	Planning/ DPW Operations	Complete within 4 years of permit effective date and implement recommendations of report, where feasible.	FY2022
Ensure any stormwater controls or management practices for new development and redevelopment meet the retention or treatment requirements of the permit and all applicable requirements of the Massachusetts Stormwater Handbook	Review, and update existing regulations as needed, to meet retention and treatment requirements of the permit, and require compliance with the Stormwater Management Standards.	Planning/DPW Operations	Complete within two years of permit effective date.	FY2020



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

### Part III: Stormwater Management Program Summary (continued)

#### MCM 6: Municipal Good Housekeeping and Pollution Prevention

<b>BMP Categorization</b> (enter your own text to override the drop down menu or entered text)	<b>BMP Description</b>	<b>Responsible Department/Parties</b> (enter your own text to override the drop down menu)	<b>Measurable Goal</b> (all text can be overwritten)	<b>Beginning Year of BMP Implementation</b>
O&M procedures	Create written O&M procedures including all requirements contained in 2.3.7.a.ii for parks and open spaces, buildings and facilities, and vehicles and equipment	DPW Operations	Complete and implement within 2 years of permit effective date.	FY2020
Inventory all permittee-owned parks and open spaces, buildings and facilities, and vehicles and equipment	Create inventory	DPW Operations	Complete within 2 years of permit effective date and update annually.	FY2020
Infrastructure O&M	Establish and implement program for repair and rehabilitation of MS4 infrastructure	DPW Operations	Complete within two years of permit effective date.	FY2020
Stormwater Pollution Prevention Plan (SWPPP) Development, Inspections, and Training	Create SWPPPs for DPW garage, and other waste-handling facilities as needed.	DPW Operations	Complete and implement within 2 years of permit effective date, and provide inspections quarterly and training annually thereafter. Track number of employees trained annually.	FY2020
Catch basin cleaning	Establish schedule for catch basin cleaning such that each catch basin is no more than 50% full and clean catch basins on that schedule.	DPW Operations	Clean catch basins on established schedule and report number of catch basins cleaned and volume of material removed annually.	FY2019

Street sweeping program	Continue to sweep all streets and permittee-owned parking lots at least once a year in accordance with permit conditions.	DPW Operations	Sweep all streets and permittee-owned parking lots once per year in the spring and report annually the miles of roadway swept or the volume of material removed.	FY2019
Road salt use optimization program	Establish and implement a program to minimize the use of road salt.	DPW Operations	Implement salt use optimization during deicing season.	FY2019
Inspection and maintenance of stormwater treatment structures	Establish and implement inspection and maintenance procedures and frequencies.	DPW Operations	Inspect all stormwater treatment structures annually. Conduct maintenance as necessary. Track number of structures inspected and maintained annually.	FY2019
Catch Basin Cleaning Optimization	Develop and implement a plan to optimize inspection, cleaning, and maintenance of catch basins to ensure that permit conditions are met.	DPW Operations	Complete within two years of permit effective date.	FY2020






Part IV: Notes and additional information

Use the space below to indicate the part(s) of 2.2.1 and 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.

Through consultation with the US Fish & Wildlife, it was determined that the only threatened species within Wenham are the northern long-eared bat and the small whorled pogonia. Actions currently proposed within this Notice of Intent will not affect these species. As Best Management Practices are constructed in the future, the Town will consult with US Fish & Wildlife prior to construction activities.

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

## 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.*

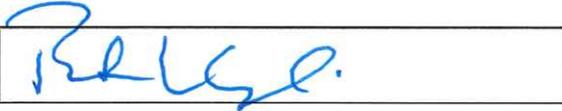
Name:

Peter Lombardi

Title:

Town Administrator

Signature:



Date:

9/20/18

[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



# 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:  
Consultation Code: 05E1NE00-2018-SLI-2570  
Event Code: 05E1NE00-2018-E-06020  
Project Name: Wenham - MS4 Permit Compliance

July 31, 2018

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](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

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## Project Summary

Consultation Code: 05E1NE00-2018-SLI-2570

Event Code: 05E1NE00-2018-E-06020

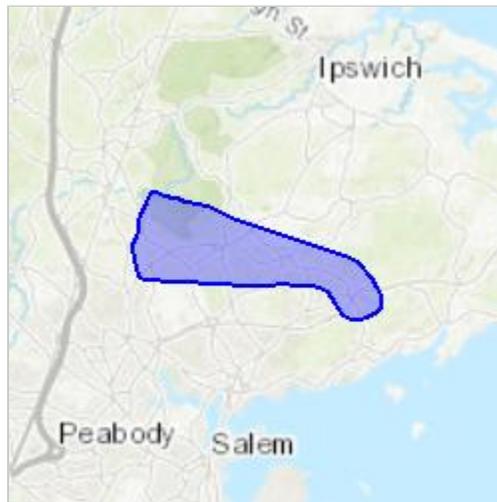
Project Name: Wenham - MS4 Permit Compliance

Project Type: \*\* OTHER \*\*

Project Description: Location is the Town of Wenham. Information is being requested as part of an endangered species determination being made as the Town seeks to obtain coverage under the Massachusetts MS4 Permit, which was effective on July 1st.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/42.60054106071888N70.8805748031188W>



Counties: Essex, MA

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## Endangered Species Act Species

There is a total of 2 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<sup>1</sup>, 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.

- 
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 <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/9045">https://ecos.fws.gov/ecp/species/9045</a>	Threatened

### Flowering Plants

NAME	STATUS
Small Whorled Pogonia <i>Isotria medeoloides</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/1890">https://ecos.fws.gov/ecp/species/1890</a>	Threatened

### Critical habitats

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

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## APPENDIX E

### 2003 MS4 Annual Reports Reference

## 2003 MS4 PERMIT ANNUAL REPORTS REFERENCE

Year 2 Annual Report (2004-2005)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2005/Wenham05.pdf>

Year 3 Annual Report (2005-2006)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2006/Wenham06ar.pdf>

Year 4 Annual Report (2006-2007)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2007/Wenham07.pdf>

Year 5 Annual Report (2007-2008)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2008/Wenham08.pdf>

Year 6 Annual Report (2008-2009)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2009/Wenham09.pdf>

Year 7 Annual Report (2009-2010)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2010/Wenham10.pdf>

Year 8 Annual Report (2010-2011)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2011/Wenham11.pdf>

Year 9 Annual Report (2011-2012)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2012/Wenham12.pdf>

Year 10 Annual Report (2012-2013)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2013/Wenham13.pdf>

Year 11 Annual Report (2013-2014)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2014/Wenham14.pdf>

Year 12 Annual Report (2014-2015)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2015/Wenham15.pdf>

Year 13 Annual Report (2015-2016)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2016/Wenham16.pdf>

Year 14 Annual Report (2016-2017)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2017/Wenham17.pdf>

Year 15 Annual Report (2017-2018)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2018/Wenham18.pdf>

## APPENDIX F

### MS4 Checklists by Permit Year

Checklist for Year 1 MS4 Permit Requirements – Wenham, MA

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
10/1/2018	Notice of Intent (NOI)	Prepare and Submit NOI for Permit Coverage 90 days from the permit effective date	1.7.2 & Appendix E	Yes
6/30/2019	Stormwater Management Plan (SWMP)	Develop written SWMP	1.10	Yes
6/30/2019	Public Education	Fulfill public education initiatives aimed at target audiences as outlined in the Town's NOI and this SWMP	2.3.2	Yes
6/30/2019	Public Participation	Fulfill public participation initiatives aimed at target audiences as outlined in the Town's NOI and this SWMP	2.3.3	Yes
6/30/2019	Illicit Discharge Detection and Elimination (IDDE) Plan	Develop written IDDE plan to satisfy permit requirements.	2.3.4.6	Yes
6/30/2019	Catchment Delineation	Delineate outfall & interconnection catchment areas.	2.3.4.5	Yes
6/30/2019	Catchment Prioritization & Ranking	Assess and rank the potential for all catchments to have illicit discharges.	2.3.4.7	Yes
6/30/2019	IDDE Employee Training	Continue to train municipal employees on illicit discharge detection and monitoring.	2.3.4.11	Yes
6/30/2019	Construction Site Runoff Control Regulatory Updates/SOPs	Create written procedures for inspection of construction sites for proper sediment & erosion controls, and conducting site plan reviews. Incorporate requirements for waste control. Reference Stormwater Manual for Sediment & Erosion Control BMPs.	2.3.5.c	Yes
6/30/2019	Street Sweeping	Sweep streets a minimum of once a year in the spring. Include miles cleaned or volume or mass of material removed in the annual report.	2.3.7.a.iii.3	Yes
6/30/2019	Catch Basin Cleaning	Clean catch basins annually to ensure the no catch basin is more than 50% full. Report	2.3.7.a.iii.3	Yes

		catch basins cleaned and volume of material removed annually.		
6/30/2019	Winter Road Maintenance SOP	Develop and implement winter road maintenance procedures including use and storage of sand/salt, and snow storage practices.	2.3.7.a.iii.5	Yes
6/30/2019	Stormwater BMP Inspection & Maintenance	Inspect all stormwater treatment structures (BMPs) at least annually and conduct maintenance as necessary. Track number of structures maintained and inspected annually.	2.3.7.a.iii.6	Yes

#### Checklist for Year 2 MS4 Permit Requirements – Wenham, MA

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
6/30/2020	Stormwater Management Plan (SWMP)	Update written SWMP	1.10	Yes
6/30/2020	Public Education	Fulfill public education initiatives aimed at target audiences as outlined in the Town's NOI and this SWMP	2.3.2	Yes
6/30/2020	Public Participation	Fulfill public participation initiatives aimed at target audiences as outlined in the Town's NOI and this SWMP	2.3.3	Yes
6/30/2020	Update Drainage Map	Update town-wide MS4 mapping to include impaired waters, BMPs, interconnections, and open channel conveyances.	2.3.4.5	Yes
6/30/2020	IDDE Employee Training	Continue to train municipal employees on illicit discharge detection and monitoring.	2.3.4.11	Scheduled
6/30/2025	IDDE Investigation of Problem Catchments	Begin investigation of problem catchments	2.3.4.8.a	N/A
6/30/2020	Post-Construction Stormwater Runoff Control Regulatory Updates	Update existing stormwater regulations as needed to include compliance with the Stormwater Management Standards, to meet	2.3.6.a.ii	Year 3

		retention and treatment requirements, to meet as-built requirements and provide for long term operation & maintenance of BMPs.		
6/30/2020	Inventory of Municipal Facilities	Develop an inventory of all permittee-owned facilities.	2.3.7.a.ii	Yes
6/30/2020	Operation and Maintenance Procedures	Develop a written set of O&M procedures for municipal facilities, activities and MS4 infrastructure	2.3.7.a.i & 2.3.7.a.iii	Yes
6/30/2020	Stormwater Pollution Prevention Plans (SWPPP)	Develop written SWPPPs for municipal waste handling facilities.	2.3.7.b	Yes
6/30/2020	Street Sweeping	Sweep streets a minimum of once a year in the spring. Include miles cleaned or volume or mass of material removed in the annual report.	2.3.7.a.iii.3	Yes
6/30/2020	Catch Basin Cleaning Optimization	Develop and implement a catch basin cleaning schedule with a goal of ensuring no catch basin is more than 50 % full. Document catch basins inspected and cleaned, including total mass removed and proper disposal.	2.3.7.a.iii.2	Yes
6/30/2020	Stormwater BMP Inspection & Maintenance	Inspect all stormwater treatment structures (BMPs) at least annually and conduct maintenance as necessary. Track number of structures maintained and inspected annually.	2.3.7.a.iii.6	Yes

**Checklist for Year 3 MS4 Permit Requirements – Wenham, MA**

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
6/30/2021	Stormwater Management Plan (SWMP)	Update written SWMP	1.10	
6/30/2021	Public Education	Fulfill public education initiatives aimed at target audiences as outlined in the Town's NOI and this SWMP	2.3.2	
6/30/2021	Public Participation	Fulfill public participation initiatives aimed at target audiences as outlined in the Town's NOI and this SWMP	2.3.3	
6/30/2021	Update Drainage Map	Update town-wide drainage mapping as needed to include MS4 infrastructure.	2.3.4.5	

6/30/2021	IDDE Employee Training	Continue to train municipal employees on illicit discharge detection and monitoring.	2.3.4.11	
6/30/2021	Dry Weather Outfall Screening and Sampling	Sample all outfalls and interconnections (excluding problem outfalls and excluded outfalls) for dry weather flow and sample flow if present.	2.3.4.7.b	
6/30/2021	Update Catchment Ranking	Update catchment ranking and prioritization based on dry weather outfall sampling data.	2.3.4.7.b.iii.c.iii	
6/30/2025	Continue IDDE Investigation of Problem Catchments	Continue investigation of problem catchments	2.3.4.8.a	
6/30/2028	Begin IDDE Investigation of High and Low Priority Catchments	Begin investigation of high and low priority catchments	2.3.4.8.a	
6/30/2021	Post-Construction Stormwater Runoff Control Regulatory Updates	Update existing stormwater regulations as needed to include compliance with the Stormwater Management Standards, to meet retention and treatment requirements, to meet as-built requirements and provide for long term operation & maintenance of BMPs.	2.3.6.a.ii	
6/30/2021	Street Sweeping	Sweep streets a minimum of once a year in the spring. Include miles cleaned or volume or mass of material removed in the annual report.	2.3.7.a.iii.3	
6/30/2021	Catch Basin Cleaning	Clean catch basins annually to ensure the no catch basin is more than 50% full. Report catch basins cleaned and volume of material removed annually.	2.3.7.a.iii.3	
6/30/2021	Stormwater BMP Inspection & Maintenance	Inspect all stormwater treatment structures (BMPs) at least annually and conduct maintenance as necessary. Track number of structures maintained and inspected annually.	2.3.7.a.iii.6	

Checklist for Year 4 MS4 Permit Requirements – Wenham, MA

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
6/30/2022	Stormwater Management Plan (SWMP)	Update written SWMP	1.10	
6/30/2022	Public Education	Fulfill public education initiatives aimed at target audiences as outlined in the Town's NOI and this SWMP	2.3.2	
6/30/2022	Public Participation	Fulfill public participation initiatives aimed at target audiences as outlined in the Town's NOI and this SWMP	2.3.3	
6/30/2022	Update Drainage Map	Update town-wide drainage mapping as needed to include MS4 infrastructure.	2.3.4.5	
6/30/2022	IDDE Employee Training	Continue to train municipal employees on illicit discharge detection and monitoring.	2.3.4.11	
6/30/2025	Continue IDDE Investigation of Problem Catchments	Continue investigation of problem catchments	2.3.4.8.a	
6/30/2028	Continue IDDE Investigation of High and Low Priority Catchments	Continue investigation of high and low priority catchments	2.3.4.8.a	
6/30/2028	Begin Wet Weather Outfall Screening and Sampling	Begin sampling outfalls and interconnections with System Vulnerability Factors during wet weather	2.3.4.8.c	
6/30/2022	Street Design and Parking Lot Guidelines	Develop a report assessing requirements that affect the creation of impervious cover to determine if design standards for streets and parking lots can be modified to support low impact design options.	2.3.6.b	
6/30/2022	Green Infrastructure Practices	Develop a report assessing the barriers and incentives for Green Infrastructure/LID techniques.	2.3.6.c	
6/30/2022	BMP Retrofit Identification	Identify 5 permittee-owned properties that could be retrofitted with stormwater BMPs.	2.3.6.d	
6/30/2022	Street Sweeping	Sweep streets a minimum of once a year in the spring. Include miles cleaned or volume or mass of material removed in the annual report.	2.3.7.a.iii.3	

6/30/2022	Catch Basin Cleaning	Clean catch basins annually to ensure the no catch basin is more than 50% full. Report catch basins cleaned and volume of material removed annually.	2.3.7.a.iii.3	
6/30/2022	Stormwater BMP Inspection & Maintenance	Inspect all stormwater treatment structures (BMPs) at least annually and conduct maintenance as necessary. Track number of structures maintained and inspected annually.	2.3.7.a.iii.6	

Checklist for Year 5 MS4 Permit Requirements – Wenham, MA

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
6/30/2023	Stormwater Management Plan (SWMP)	Update written SWMP	1.10	
6/30/2023	Public Education	Fulfill public education initiatives aimed at target audiences as outlined in the Town's NOI and this SWMP	2.3.2	
6/30/2023	Public Participation	Fulfill public participation initiatives aimed at target audiences as outlined in the Town's NOI and this SWMP	2.3.3	
6/30/2023	Update Drainage Map	Update town-wide drainage mapping as needed to include MS4 infrastructure.	2.3.4.5	
6/30/2023	IDDE Employee Training	Continue to train municipal employees on illicit discharge detection and monitoring.	2.3.4.11	
6/30/2025	Continue IDDE Investigation of Problem Catchments	Continue investigation of problem catchments	2.3.4.8.a	
6/30/2028	Continue IDDE Investigation of High and Low Priority Catchments	Continue investigation of high and low priority catchments	2.3.4.8.a	
6/30/2028	Continue Wet Weather Outfall Screening and Sampling	Begin sampling outfalls and interconnections with System Vulnerability Factors during wet weather	2.3.4.8.c	
6/30/2023	Street Sweeping	Sweep streets a minimum of once a year in the spring. Include miles cleaned or volume or mass of material removed in the annual report.	2.3.7.a.iii.3	
6/30/2023	Catch Basin Cleaning	Clean catch basins annually to ensure the no catch basin is more than 50% full. Report catch basins cleaned and volume of material removed annually.	2.3.7.a.iii.3	
6/30/2023	Stormwater BMP Inspection & Maintenance	Inspect all stormwater treatment structures (BMPs) at least annually and conduct maintenance as necessary. Track number of structures maintained and inspected annually.	2.3.7.a.iii.6	

## APPENDIX G

### Public Education Materials



## Do Your “Doody” for Clean Water

You hate stepping in it. And fish hate swimming in it, too! Dogs produce a lot of waste which, if not disposed of properly, can end up in our waterways. Do your part to keep our waters and public areas clean and healthy! Bag your pet’s waste and throw it in a trashcan.

**DO**



**DON'T**



**Did you know that the average dog can produce nearly a pound of waste each day?**

- Pet waste left on lawns and in public spaces is not only gross. It can be quite harmful too.
- Pet waste contains twice as much bacteria as human waste!
- If left in your yard, pet waste can kill grass and other plants.
- Adults and children who come in contact with it can get sick.
- When pet waste washes into storm drains and waterways, it can make the water unhealthy for people and wildlife.
- Pet waste in waterways can even cause algae to grow, making the water turn an unpleasant green color.

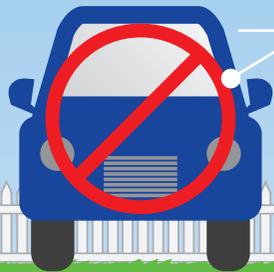
**Do your "doody" in both public areas and in your yard.**

To learn more, visit the [www.ThinkBlueMassachusetts.org](http://www.ThinkBlueMassachusetts.org)

# Do Your Part. Be SepticSmart!



**Shield Your Field**  
Divert rain and surface water away and avoid parking vehicles and planting trees on your drainfield.



**Don't Overload the Commode**  
Don't flush diapers, wipes or other items meant for a trashcan down the toilet.



**Think at the Sink**  
Limit use of your garbage disposal and avoid pouring fats, grease, solids and harsh chemicals down the drain.



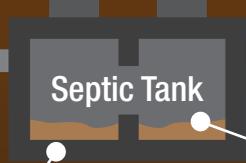
**Don't Strain Your Drain**  
Use water efficiently and stagger use of water-based appliances, such as your washing machine or dishwasher.

**Protect It and Inspect It**  
A typical septic system should be serviced every one to three years by a septic service professional.

**Pump Your Tank**  
Ensure your septic tank is pumped at regular intervals as recommended by a professional.

**Keep It Clean**  
If you are on a well, test your drinking water regularly to ensure it remains clean and free of contamination.

**Drainfield**  
**Groundwater Recharge**



**Aquifer**

## APPENDIX H

### Regulatory Mechanisms



# **TOWN OF WENHAM**

## **By-Laws**

**2016**

# By-Laws of the Town of Wenham

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# By-Laws of the Town of Wenham

## CHAPTER I TOWN MEETINGS

### SECTION 1

Five percent of the registered voters on the voting list at the time of an annual town meeting shall constitute a quorum for such annual meeting, and two percent of the registered voters on the voting list at the time of the annual town meeting shall constitute a quorum for all special town meetings prior to the next annual town meeting, provided that a number less than a quorum may from time to time adjourn the same. This section shall not apply to such parts of meetings as are devoted to the election of town officers. (Amended 5/12/83)

### SECTION 2

The annual town meeting shall be held on the first Saturday in May or April of each year unless the Selectmen vote on or before December 31 of the preceding year to establish another date in order to suit the public convenience for the reasons the Selectmen shall determine including, but not limited to, conflicts with the observance of holidays. (Amended STM vote 11/8/2011. Approved by the AG 12/7/2011. Effective as of 2013)

### SECTION 3

A motion to reconsider or to rescind a previous vote of the meeting may be made only for such compelling reasons as a change of circumstances, or the acquisition of new information since the original vote was taken, and may be made only on the same day as the original vote. (Amended 5/7/77)

### SECTION 4

A motion to change the order of consideration of articles from that set forth in the Warrant shall be in order only when a change of circumstances, error, or discovery of new information has occurred since the posting of the Warrant that bears directly upon the purpose or effect of the article to be postponed or advanced, and may not be adopted solely to affect the time of voting on an article.

### SECTION 5

In the case of action on a matter which by statute requires a two-thirds vote, the Town vote may be declared by the Moderator without taking and recording a count, as provided in M.G. Laws Chapter 39, Section 15, unless the vote so declared is immediately questioned by seven (7) or more voters. (Amended 10/5/2005)

(Please note that the STM on 11/8/2011 the following was approved; Town meeting warrant posting requirements were changed from the key intersections throughout town to the following prominent public facilities: Town Hall, Library, Senior Center, the bulletin board outside the post office and on the town website.)

## CHAPTER II LEGAL AFFAIRS

The Board of Selectmen shall have authority to prosecute, defend and comprise all litigation to which the town is a party, and to employ counsel whenever, in their judgment, necessity therefor arises.

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Holiday Leave - All permanent full-time employees of the town shall receive eleven (11) paid holidays in each year; namely, January 1, Washington's Birthday, Martin Luther King Day, Patriots' Day, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day and Christmas Day. All employees whose duties require working on one of these holidays shall receive another day off with pay. (Amended 5/3/75)

Personnel Policies - The Board of Selectmen shall have authority to establish Personnel Policies for employees of the town. A public hearing, notice of which is to be published at least seven (7) days prior to the hearing in a newspaper of general circulation in the town, shall be held prior to the adoption or change of any Personnel Policy. For purposes of this bylaw, Personnel Policies may include any conditions of employment not otherwise governed by state or federal law. (Amended 5/9/81)

The executive powers of the town of Wenham shall be vested in a three-member board of selectmen elected for three year rotating terms. Such board shall serve as the chief executive officer and policymaking entity of the town. The board of selectmen shall continue to have and be able to exercise all the powers and duties vested in boards of selectmen under the General Laws or by vote of the Town, and such other authority as specified herein, including, but not limited to:

- Adopting policies of general application to elected and appointed multiple member bodies, officers and employees of the town, to the extent allowed by law, and enacting rules and regulations implementing the same;
- Instituting, prosecuting, compromising or defending any claim, action, suit or other proceeding in the name of the Town and authority to settle any claim, action, suit or other proceeding brought by or on behalf or against the Town;
- Appointing ad-hoc policy committees to study particular issues or provide the board with advice;
- Acting as the licensing authority of the town;
- Calling town meetings and elections and issuing warrants therefor;
- Appointing a town administrator to assist the board in carrying out its duties and responsibilities under state law or this act, establishing the duties and responsibilities of said office, and entering in an employment contract with said officer;
- Investigating the affairs of the town and the conduct of any department, office or agency thereof;
- Executing collective bargaining agreements and other contracts of the town; and
- Such other matters as may be provided for by bylaw or other vote of town meeting.

Provided, however, that it is the intention of this bylaw that the board of selectmen shall not act to derogate from the statutory authority of multiple-member bodies and other appointees of the Board and departments under its responsibility, and, to the extent allowed by law, other multiple-member bodies, officers and employees of the town.

(Amended BY ATM vote 4/11/2015 Article 16, Approved by the Attorney General 8/18/2015)

### **CHAPTER III FINANCE AND ADVISORY COMMITTEE**

#### **SECTION 1**

There shall be a Finance and Advisory Committee consisting of FIVE legal voters of the town, and no elected

## By-Laws of the Town of Wenham

or appointed town officer or employee shall be eligible to serve on said Committee.  
(Amended BY ATM vote 4/11/2015 Article 17)

### SECTION 2

The Finance and Advisory Committee shall be chosen by an appointing committee consisting of the Moderator, the Chairman of the Board of Selectmen, and the Chairman of the Finance and Advisory Committee as provided in Section 3.

On July 1 of each fiscal year, such appointing committee or a majority of them, shall appoint **one or** two members of the Finance and Advisory Committee for terms expiring on June 30 of the third succeeding fiscal year as may be needed to bring the total number of members to five. Any member who is appointed and serves for a second consecutive full three-year term shall be ineligible for reappointment until after the next succeeding annual town meeting. (Amended 5/2/98)

Whenever a vacancy occurs in the membership of the Finance and Advisory Committee, such vacancy shall be filled by the appointing committee for the balance of the unexpired term. If any member of the Finance and Advisory Committee becomes an elected or appointed town officer or employee, or is absent from five successive meetings, except in case of illness, his position shall be deemed to be vacant.

(Amended BY ATM vote 4/11/2015 Article 17, Approved by the Attorney General 8/18/2015)

### SECTION 3

The Finance and Advisory Committee shall meet for the purpose of organization as soon as possible after the annual appointment of its new members, and shall elect from its membership a chairman and a secretary who shall hold office until their successors are elected. Thereafter they shall meet from time to time at the call of the chairman or any two members thereof. Said Committee shall cause to be kept a true record of its proceedings. The chairman shall be a member of the appointing committee during his term of office as chairman and thereafter until a succeeding chairman is elected. (As amended 5/2/98)

### SECTION 4

The Finance and Advisory Committee shall consider all articles and warrants for town meetings involving an appropriation or expenditure of money or the disposition of any property of the town. The Committee shall hold prior to each annual town meeting one or more meetings at which the Selectmen and other invited officers, boards and committees of the town shall be present to consider the items which make up the annual budget and any other municipal matters. In discharge of its duty, said Committee shall have free access to all books of record and accounts, bills and vouchers on which money has been or may be paid from the town treasury. Officers, boards and committees of the town shall furnish said Committee upon request with facts, figures and any other information pertaining to their several activities.

The recommendations of the Committee on the articles in the warrant for the annual town meeting shall be printed in the annual town report, which shall be distributed, if possible, one week before the date of said meeting.

(The failure, for any reason, of the Committee to make such recommendations shall not affect the legality of any action taken at any meeting.) (As amended 3/7/59)

## CHAPTER IV FINANCIAL AFFAIRS

### SECTION 1

There shall be an annual audit of the town's accounts under the supervision of the Director of Accounts of the

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Department of Corporations and Taxation in accordance with the provisions of Section 35, Chapter 44, General Laws.

## SECTION 2

The Collector of Taxes shall collect, under the title of "Town Collector," all accounts due the town, in accordance with the provisions of Section 38A, Chapter 41, General Laws.

## SECTION 3

All town officers shall pay all fees received by them by virtue of their office into the town treasury, including, without limiting the generality of the foregoing, all fees received by the Town Clerk for sporting and trapping licenses as agent for the Massachusetts Department of Fisheries and Game, and all fees for issuing dog licenses as agent for the County of Essex. (As amended 3/17/62)

## SECTION 4

Any board or officer in charge of a department of the town may, with the approval of the Board of Selectmen, sell any town property which is within the possession or control of the department, and which has become obsolete or is not required for further use by the department, or trade the same in part payment for replacements for which funds have been provided. (As amended 3/20/71)

## SECTION 5

No contract in the amount of Ten Thousand Dollars (\$10,000) or more with a contractor employing six or more persons shall be entered into by the town directly or through any agency of the town unless the contractor certifies in writing to the Town that the contractor is in compliance with Chapter 151B of the General Laws, and sets forth affirmative action which the contractor provides for equal opportunities for all qualified persons without regard to age, sex, race, color, religion, or national origin. (Amended 3/20/71)

## SECTION 6

The Selectmen shall appoint a Finance Director to serve as the chief financial officer of the Town, and to determine the duties and authority of the Finance Director, including cash management, borrowing, budget annual budget development, accounting policies and procedures for all town departments and officers. The positions of Treasurer, Collector, and Accountant shall report to the Finance Director, who may also serve as either the Treasurer or Accountant with the approval of the Selectmen.

(Amended BY ATM vote 4/11/2015 Article 15 Approved by the Attorney General 8/18/2015)

## **CHAPTER V CERTAIN ACTS PROHIBITED**

### SECTION 1

No persons shall remain assembled on any sidewalk in front of any church, dwelling house, or other building so as to obstruct passage along the same, or to impede or annoy other persons.

### SECTION 2

No person shall be a collector of, or a dealer in, junk, old metals or secondhand articles, or a keeper of a shop for the purchase, sale or barter of junk, old metals or secondhand articles unless licensed therefor by the Selectmen.

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## SECTION 3

No person shall throw stones, snowballs, sticks or other missiles, kick a football, play at any game in which a ball is used, fly kites, shoot with or use an air-gun, bow and arrows, slingshots, or other similar devices, on or across any public ways of this town.

## SECTION 4

Repealed by ATM vote 4/5/2014, Effective 9/16/2014)

## SECTION 5

No person shall operate upon any street in the town a motor vehicle carrying bituminous coal, or other dust-emitting material, without covering said material in such a way as to prevent flying dust.

## SECTION 6

No person shall maliciously throw or drop any paper, paper container or other refuse on any public way in this town.

## SECTION 7

No person shall maliciously throw or drop any flaming, smoldering or burning, material from a vehicle of any kind on public ways in this town.

## SECTION 8

No person shall fire or discharge any firearm within the limits of any park, playground or other public property except with the written consent of the Board of Selectmen, or hunt, trap, or fire or discharge any firearm on any private property except with the written consent of the owner, his authorized agent, or the legal occupant thereof.

This bylaw shall not apply to the lawful defense of life or property, or to any law enforcement officer acting in the discharge of his duties. (As amended 3/19/60)

## SECTION 9

(a) Licenses Required. It shall be unlawful for any solicitor or canvasser as defined in this bylaw to engage in such business within the Town without first obtaining a license therefor in compliance with the provisions of this bylaw. The provisions of this bylaw shall not apply to any person exempted under Chapter 101 of the General Laws, or to any person duly licensed under Chapter 101 of the General Laws, or to any person exempted by any other General Law, nor shall this bylaw be construed to prevent route salesmen or other persons having established customers to whom they make periodic deliveries from calling upon such customers or from making calls upon prospective customers to solicit an order for future periodic route deliveries.

(b) Definition. A solicitor or canvasser is defined as any person who, for himself, or for another person, firm or corporation, travels by foot, automobile or any other type of conveyance from place to place, from house to house, or from street to street, taking or attempting to lease or take orders for retail sale of goods, wares, merchandise, or services, including without limiting, the selling, distributing, exposing for sale or soliciting orders for magazines, books, periodicals or other articles of a commercial nature, the contracting of all home improvements, or for services to be performed in the future whether or not such individual has, carries or exposes for retail sale a sample of the subject of such sale or whether he is collecting advance payment on such retail sales. For the purpose of this act, persons engaged in

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the pursuit of soliciting for charitable benevolent, fraternal, religious or political activities shall be exempt from the licensing requirements as set forth.

(c) Application. Applicants for a license shall file with the Chief of Police, on a form issued by the Police Department, a written application signed under the penalties of perjury, containing the following information:

- 1) Name of applicant.
- 2) Address of applicant (local and permanent home address).
- 3) Applicant's height, weight, eye and hair color.
- 4) Applicant's social security number.
- 5) The length of time for which the right to do business is desired.
- 6) A brief description of the nature of the business and the goods to be sold.
- 7) The name and home office address of the applicant's employer. If self-employed, it shall so state.
- 8) A photograph of the applicant, which picture shall be submitted by the applicant and be 2" x 2" showing the head and shoulders of the applicant in a clear and distinguishing manner.
- 9) If operating a motor vehicle: the year, make, model, motor number registration number, state of registration, vehicle's owner and address.
- 10) The finger prints of all persons participating in the solicitations. (Amended BY ATM vote 4/11/2015 Article 20, Approved by the Attorney General 8/18/2015)

At the time filing the application, each applicant shall pay a fee of twenty dollars (\$20.00)

(Amended BY ATM vote 4/11/2015 Article 20, Approved by the Attorney General 8/18/2015)

(d) Investigation and Issuance.

- 1) Upon receipt of the application, the Chief of Police shall investigate the applicant's reputation as to morals and integrity.
- 2) After an investigation of the applicant's morals and integrity, but within seven business days of the filing of the applicant, the Chief of Police shall endorse on such application his approval or disapproval. Failure of the Police Chief to act on said permit within seven business days of the applicant's filing shall constitute approval. If disapproved, the applicant shall have the right of appeal to the Board of Selectmen in writing within seven days of the denial by the Chief of Police. The Board of Selectmen must act upon the appeal at one of their next two regularly scheduled meetings. Failure to so act shall be deemed approval.
- 3) Such license when issued shall contain the signature of the Chief of Police or the Board of Selectmen and shall show the name, address, and photograph of said licensee, the date of issuance and length of time the same shall be operative, as well as the license number. The Police Department shall keep a record of all licenses issued for a period of six (6) years. Solicitors and canvassers when engaged in the business of soliciting or canvassing are required to display an identifying badge issued by the Police Department, by wearing said badge on an outer garment. Each licensee is required to possess an individual license.

(e) Duty of Police to Enforce - Transfer. The police officers of the Town shall enforce this bylaw. No license shall be transferred.

(f) Revocation of License. The Chief of Police is hereby vested with jurisdiction over the revoking of licenses. Any person aggrieved by revocation may appeal to the Board of Selectmen within seven business days, and a hearing will be scheduled for one of the next two regularly scheduled meetings of the Board of Selectmen.

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- (g) Expiration of License. Each license issued under the provisions of this bylaw shall continue in force from the date of its issue until the thirty-first day of December following, unless sooner revoked.
- (h) Renewal of License. A license issued under the provisions of this bylaw may be renewed by the Chief of Police. An applicant requesting a renewal of a license must apply in person for such license renewal, and provide such information as is required to obtain an initial license.
- (i) Misrepresentation.
- 1) No solicitor or canvasser, licensed or exempted from license, may misrepresent, in any manner, the buyer's right to cancel as stipulated by Chapters 93, 93A and 255D of the General Laws.
  - 2) No solicitor or canvasser, licensed or exempted from license, may use any plan, scheme or ruse which misrepresents the true status or mission of the person making the call in order to gain admission to a prospective buyer's home, office, or other establishment with the purpose of making a sale of consumer goods or services.
- (j) Trespassing. It shall be unlawful for any canvasser or solicitor to enter the premises of a resident or business who has displayed a "no trespassing" or "no soliciting" sign or poster. Further, it shall be unlawful for canvassers or solicitors to ignore a resident or businessperson's no solicitation directive or remain on private property after its owner has indicated that the canvasser or solicitor is not welcome.
- (k) Penalty. Any person violating any provision of this bylaw shall, upon conviction therefore, be punished by a fine not to exceed fifty dollars (\$50) for each and every offense. (As amended 5/4/91)

### SECTION 10

No person owning land on which there is situated a permanent artificial sunken swimming pool containing twenty-four inches or more in depth of water, at any point, shall fail to erect and maintain thereon an adequate enclosure surrounding either the property or the pool area, sufficient to make such a body of water inaccessible to small children. Such enclosure, including gates therein, must be not less than four feet above the underlying ground; all gates must be self-latching with latches placed four feet above the underlying ground or otherwise made inaccessible from the outside to small children. A pool cover or other protective device approved by the Board of Selectmen may be used so long as the degree of protection afforded by the alternate devices or structures is not less than the protection offered by the enclosure, gate and latch described herein. (As amended 3/18/67)

### SECTION 11

The Superintendent of Streets shall be authorized to remove or cause to be removed to a convenient public garage any vehicle interfering with the removal or plowing of snow or ice, and the cost of such removal or storage charges, if any, resulting therefrom shall be paid by the owner of the vehicle. (As amended 12/30/63)

### SECTION 11

Any non-resident of Wenham who requests the Wenham Police Department to process finger prints for employment or other purposes not at the request of the Department shall pay a fee of \$20 to the Police Department for processing fingerprints under such circumstances.”

**(Amended BY ATM vote 4/11/2015 Article 21, )**

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## SECTION 12

No persons shall play, push or throw any snow or ice onto any street or sidewalk of the town unless it is immediately removed therefrom. (As amended 12/30/63)

## SECTION 13

### Unregistered Motor Vehicles

- (a) The keeping of more than one unregistered motor vehicle, assembled or disassembled, except by a person licensed under General Laws, Chapter 140, Section 59, on any premises shall not be permitted unless said vehicles are stored within an enclosed building.
- (b) A Special Permit to keep more than one unregistered motor vehicle on any premises not within an enclosed building after a duly called public hearing to which all abutters to the premises have received notice may be granted by the Board of Selectmen if it finds that such keeping:
- 1) Is in harmony with the general purposes and intent of this bylaw:
  - 2) Will not adversely affect the neighborhood, and
  - 3) Will not be a nuisance
- (c) All such special permits shall limit the number of unregistered motor vehicles to be kept on the premises by the permit holder, shall not run with the land, and shall be limited to a reasonable length of time.
- (d) This article shall not apply to motor vehicles which are designed for and used for farming purposes.
- (e) Whoever violates any provisions of this article of the bylaws shall be liable to a penalty of \$5.00 per day for each day of violation, commencing ten (10) days following the date of receipt of written notice of such violation from the Board of Selectmen. (As amended 3/21/70)

## SECTION 14

### Motor Vehicles, Snow Vehicles and Recreation Vehicles

No person shall use or operate a motor vehicle, trail bicycle, motor bicycle or similar motorized vehicle which is eligible for registration under Chapter 90B of the General Laws of the Commonwealth, or a snow vehicle or recreation vehicle as defined in Section 20 of said Chapter, in any park or other town-owned property except public roads and streets without the prior written consent of the Board of Selectmen, who shall first obtain consent of the town board having the responsibility for the management of such property. Any such consent shall be temporary in nature, shall specify the period of time during which it is in force and shall only be granted where the proposed use or operation will not, in the judgment of the boards granting the same, be detrimental to the purpose for which such property is owned. Notwithstanding anything to the contrary herein above contained, parking areas established for use in connection with such park or such other public property may be used for parking purposes without prior consent.

No person shall use or operate any such vehicle on or over any private property within the limits of the town without the written consent of the owner of such property.

No person shall operate a snow vehicle for other than an emergency between the hours of 8:00 P.M. and 8:00 A.M. (As amended 3/18/72)

## SECTION 15

Unless granted a special permit by the Board of Selectmen, no person shall drink any alcoholic beverage, or have in his/her possession an open container of alcoholic beverage as defined in Massachusetts General Laws, Chapter 138, Section 1, upon any public way, public parking area, school property, town park or recreation area, on any way or property to which the public has a right of access as invitees or licensees, or upon any private property without the consent of the owner or his/her authorized representative. (As Amended 5/12/79)

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## SECTION 16

No person shall use or operate a boat or other vessel powered by an internal combustion engine on Pleasant Pond. This Bylaw shall not apply to any emergency or life-saving operation carried out by or with the approval of the Police Department, Fire Department, Parks and Recreation Commission, or the Board of Selectmen. (Amended 6/12/79)

## **CHAPTER VI      MOTOR VEHICLE REGULATIONS**

No person having charge of a motor vehicle in a public street shall refuse or neglect to stop the same as directed by a police officer.

## **CHAPTER VII      CURFEW**

No child under 16 years of age shall be, loiter, or remain upon any street, highway or place in this town after the hour of nine o'clock in the evening of any day, unless accompanied by or under the control or care of a parent, guardian or other adult person; or unless in some employment, or in the performance of some duty directed in writing by said parent, guardian or other adult person; and no such child, while in such employment or performance of such duty, shall loiter upon any such street, highway, park or other public way or place.

## **CHAPTER VIII      PENALTIES**

Any person who shall violate any of the provisions of Chapters V - VII inclusive of these Bylaws shall forfeit and pay, for each offense, a sum not exceeding one hundred dollars. (As amended 5/14/88)

## **CHAPTER IX      PLANNING BOARD**

### SECTION 1

A Planning Board is hereby established under the provisions of General Laws (Ter. Ed.) Chapter 41, Section 81A (Acts of 1936, Chapter 211), to consist of five members, one member to be elected each year at the annual town meeting for a term of five years. The members shall serve without pay.

### SECTION 2

At the first annual town meeting after the adoption of this bylaw, there shall be elected one member to serve for one year, one member to serve for two years, one member to serve for three years, one member to serve for four

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years, and one member to serve for five years.

## SECTION 3

It shall be the duty of the Planning Board to study and make plans for the resources, possibilities, and needs of the town; to make a master plan as provided in Chapter 41, Section 81B of the General Laws, showing all existing and desirable features of the town; to extend and improve said master plan from time to time to suit the needs and desires of the town; to report annually to the town on the results of its studies, with any recommendations; to receive for approval, as provided in Chapter 41, Section 81F of the General Laws, plots of all subdivisions of land proposed in the town and to approve such plots as conform to the master plan; to examine plans of proposed streets or other municipal improvements and make recommendations regarding the same; and to report to the town on any item referred to it by the town for its opinion.

## SECTION 4

The Planning Board shall prepare, or have prepared under its direction, a map of the town showing existing public ways and parks, and private ways used in common with two or more owners. Said map when prepared shall be submitted to the town meeting for adoption, and upon adoption shall become the official map of the town as provided in Section 81C of Chapter 41 of the General Laws.

## SECTION 5

All articles in any warrant for a town meeting pertaining to the physical resources and features of the town shall be referred to the Planning Board for its consideration. The Selectmen, after drawing any such warrant, shall transmit immediately a copy thereof to each member of the Board. The Board shall, after due consideration, report thereon to the town meeting in writing such recommendations as it deems best for the interest of the town and its citizens.

## SECTION 6

No street shall be proposed for acceptance at any town meeting unless such proposed action shall have been submitted to the Planning Board for its recommendation at least 60 days prior to the date of the meeting.

## **CHAPTER X                      ZONING BOARD OF APPEALS**

### **SECTION 1**

A Zoning Board of Appeals, established pursuant to Chapter 41 of the General Laws, is as set forth in Section 13.2 of the Protective Zoning Bylaw of the Town”.

(Approved at the Annual Town Meeting 4/2/2016 and accepted by the Attorney General 7/12/2016)

**Effective 7/19/2016 when posted**

## **CHAPTER XI                      REPEAL OF BYLAWS PASSED HERETOFORE**

All bylaws heretofore adopted are hereby repealed.

(The foregoing is a true copy of the Bylaws accepted at the Annual Town Meeting of March 5, 1945, and approved by the Attorney General, Clarence A. Barnes, under date of April 4, 1945, and as amended at the

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Special Town Meeting held on May 11, 1955 and approved by Attorney General George Fingold, June 29, 1955.)

## CHAPTER XII EARTH REMOVAL BYLAW

### A. Purpose

The purpose of this bylaw is to promote the health, safety, welfare and amenities of the community or any neighborhood thereof, to prevent harmful results from improper excavation and to assure compliance with the Master Plan of the Town of Wenham.

### B. General

1. This section is adopted under the authority of General Laws, Chapter 40, Section 21, Clause 17.
2. For the purposes of this bylaw, "earth" shall include soil, loam, sod, clay, sand and gravel or quarried stone, or any combination thereof.
3. The Board of Selectmen referred to in this bylaw shall be the same Board of Selectmen established under Section 1, Chapter 41 of the General Laws or the predecessor thereto.

### C. Permits Required

1. Other than as excepted in this Section no earth shall be removed from any parcel of land not in public use, either above or under water, in the Town of Wenham unless by and in accordance with a permit issued under the authority of this bylaw. In order to preserve the natural resources of the Town of Wenham, the removal from the town of topsoil or sod is prohibited; relocation within the town of topsoil or sod from one parcel of land to another, within the town, is permitted by written permit as hereinafter set forth.
2. The annual removal of earth other than topsoil or sod in a quantity less than one hundred (100) cubic yards per year or the removal of topsoil or sod in a quantity of less than ten (10) cubic yards per year shall be exempt from the provisions of this bylaw.
3. The removal of earth in compliance with the requirements of a subdivision plan approved by the Planning Board is exempt from the provisions of this bylaw.
4. The grading and redistribution of earth on any site is governed by Section VII-B of the Zoning Bylaw of the Town of Wenham.

### D. Permit Applications

Application for a permit hereunder shall be filed with the Board of Selectmen and the Town Clerk in such forms as the Board of Selectmen shall prescribe from time to time. In the event that no rules have been prescribed at the time of the application, within thirty (30) days of filing the application the Board of Selectmen may require the applicant to furnish such additional specified information as may be reasonably useful and further may also require a refiling within thirty (30) days of date of notice to applicant. The legal date of filing of application, for all purposes including those specified in section E, herein, shall be the date of last filing.

### E. Permit Hearing

1. No permit shall be issued without a public hearing held within sixty-five (65) days of the filing of the application with the Town Clerk in conformity with provisions for special permits under Sections 9 and 11 of Chapter 40A, General Laws.
2. Failure of the Board of Selectmen to take final action within 90 days after the hearing shall be deemed

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approval of the requested permits, provided that such permits shall be valid only for six (6) months from the date of automatic approval, excluding the time required to pursue or await the determination of appeal, and further provided that all work shall be done in accordance with the standards for earth removal in subdivisions as stipulated in the Rules and Regulations governing subdivisions, of the Planning Board of the Town of Wenham.

3. Permits issued by vote of the Board shall automatically expire upon completion of the earth removal project for which it was issued or at such time as may be specified in said permit, and in any event within one (1) year from the date of issue thereof.

4. A permit may be renewed by the Board of Selectmen for a period of one (1) year without a hearing if it finds that all conditions then applicable have been complied with and that the work has been carried on continuously and in good faith. A permit may not be renewed more than once without a hearing, unless in the opinion of the Board of Selectmen the area of the previous permit is being satisfactorily restored for use in accordance with the reuse plan approved by said Board.

5. Where a permit is required hereunder in connection with the development of a large-scale ground-mounted solar photovoltaic installation pursuant to Section 10.2 of the Zoning By-Law, an application therefor shall be submitted simultaneously with an application for site plan review under said Section 10.2. So as to comply with Section 22 of the Green Communities Act, amending G.L c. 25A sec 10 (c ), the review of such application shall be expedited and a decision thereon shall be rendered no later than one (1) year from the date of submittal thereof. (Amended 2010)

### F. Permit Issuance

1. Permits for earth removal may be issued by the Board of Selectmen subject to the approval where required and the advice where applicable of the Planning Board, Conservation Commission, Board of Health, Highway Department, Police Department and other relevant town departments, subject to the express limitations provided hereinafter and to such additional limitations of time and usage as the Board feels are reasonably required to satisfy the purpose of this bylaw. The Board of Selectmen shall be guided by the standards for earth removal in subdivisions as adopted from time to time by the Planning Board in their Rules and Regulations for Subdivisions.

2. Permits for earth removal shall be issued only upon condition that a cover of topsoil of not less than six inches (6") in depth shall be replaced or allowed to remain, except where, due to construction of roads, buildings or other permanent physical features, such provision is impractical. Such topsoil cover shall be seeded with a perennial cover crop to assure uniform growth and surface soil stabilization.

3. In exercising its discretion under this bylaw, the Board of Selectmen shall not issue any permit for earth removal if in their opinion such removal will:

- a. Endanger the public health or safety or constitute a nuisance because of noise, vibration, smoke, gas fumes, odor, erosion, pollution or other objectionable features, hazard or explosion or fire.
- b. Produce noise, dust or other effects observable at the lot lines in amounts seriously objectionable or detrimental to the normal use of the adjacent property or the economic condition of the district or town.
- c. Result in the transportation over town ways which will be injured in any way by loads in excess of the road capability or by means of handling vehicles used to transport earth or of handling materials in transport.
- d. Alter any significant topographical feature or result in a change in the topography and cover which will be disadvantageous to the appropriate reuse of the land as permitted by the Zoning Bylaw.

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### G. Prohibitions

The Board of Selectmen shall not issue any earth removal permit if the work extends within three hundred feet (300') of a way open to public use, whether public or private, or two hundred fifty feet (250') of a building or structure, or within one hundred feet (100') of a natural stream or body of water unless the Board is satisfied that the removal will not undermine the way or structure and will not cause damage to the abutting property, stream or body of water.

### H. Validity

The invalidity of any section, subsection or provision of this bylaw shall not invalidate any other section or provision thereof.

### I. Administration, Enforcement and Penalties

1. The Board of Selectmen or duly authorized representative shall review the progress of the work from time to time to ensure proper conduct.
2. If the Board of Selectmen concludes that there has been a violation of this bylaw, a notice of violation shall be sent to the landowner and where applicable, the permit holder, by registered or certified mail to the address of the landowner on the Town records and, when applicable, to the address of the permit holder on the initial application, and may send a notice ordering a cessation of the improper activities, or take any other action necessary to prohibit further violation.
3. Each violation of this bylaw shall be subject to a fine of \$50 for the first offense, \$100 for the second and \$200 for each subsequent offense, under the terms of General Laws, Ter. Ed., Chapter 40, Section 21, Paragraph 17. Each truckload, or partial truckload, and each day of noncompliance shall constitute a separate offense. The land owner, the permit holder and the driver of the truck shall be jointly and severally liable for the fines.
4. Whether or not specified in the permit, the Board of Selectmen shall have the power to revoke or suspend a permit issued under this bylaw if any permit provisions are not fully complied with by the permit holder or any of its employees, agents, or contractors, either directly or indirectly.

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## CHAPTER XIII SMOKE DETECTORS AND SPRINKLER SYSTEMS

All buildings or structures occupied in whole or in part for residential purposes and not regulated by Sections 26A, 26B or 26C of the Massachusetts General Laws, shall upon the sale or transfer of such building or structure, be equipped by the seller with approved smoke detectors as provided in Section 26E of the Massachusetts General Laws. The head of the Fire Department shall enforce the provisions of this bylaw. The provisions of Chapter 148, Section 30, of the Massachusetts General Laws shall not apply to this bylaw. (Amended 5/9/81)

### SPRINKLER SYSTEMS

In any city or town which accepts the provisions of this section, every building or addition of more than seven thousand five hundred gross square feet in floor area shall be protected throughout with an adequate system of automatic sprinklers in accordance with the provisions of the state building code. No such sprinkler system shall be required unless sufficient water and water pressure exists. For purposes of this section, the gross square feet of a building or addition shall include the sum total of the floor areas for all floor levels, basements and subbasements, measured from outside walls, irrespective of the existence of interior fire restrictive walls, floors and ceilings.

In such buildings or additions, or in certain areas of such buildings or additions, where the discharge of water would be an actual danger in the event of fire, the head of the fire department shall permit the installation of such other fire suppressant systems as are prescribed by the state building code in lieu of automatic sprinklers. Automatic suppressant or sprinkler systems shall not be required in rooms or areas of a telephone central office equipment building when such rooms or areas are protected with an automatic fire alarm system. Sprinkler systems shall not be required in a one-story building having a fire resistance rating as prescribed in the state building code that is solely for offices, provided the building is protected by an automatic fire alarm system. This section shall not apply to buildings or additions used for residential purpose.

The head of the fire department shall enforce the provisions of this section.

This act shall apply to construction of buildings or additions or major alterations commenced after July 1, 1983.

### SMOKE DETECTORS

In any city or town which accepts this subsection, one- and two-family dwellings occupied in whole or in part for residential purposes and not required by section twenty-six A or twenty-six B shall be equipped with approved smoke detectors. Owners of such buildings or structures shall install either an approved monitored battery-powered smoke detector or an approved primary power smoke detector on each level of habitation and on the basement level; provided however, that the head of the fire department shall allow the installation of approved monitored battery-powered smoke detectors. Such approved smoke detectors shall be installed in the following manner: an approved smoke detector shall be installed on the ceiling of each stairway leading to the floor above, near the base of, but not within each stairway, and an approved smoke detector shall be installed outside each separate sleeping area.

Buildings or structures occupied in whole or in part for residential purposes and containing not less than three nor more than five units and not regulated by Section twenty-six A, twenty-six B or twenty-six C shall be equipped with approved smoke detectors. Owners of such buildings or structures shall install either an approved

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monitored batter-powered smoke detector or an approved primary-power smoke detector outside each separate sleeping area; provided, however, that the head of the fire department shall allow the installation of approved monitored battery-powered smoke detectors; and provided further, that in all common hallways and basements of said residential buildings or structures a series of interconnected approved primary-power smoke detectors shall be installed.

For the purposes of this section, "approved primary power" shall mean an alternating-current primary source of electric power furnished by an electric power or light company municipally operated or operating under the authority of the department of public utilities which is the primary source of electricity or is a secondary source but is permanently wired thereto and will become operational upon the failure of the primary source of power.

The head of the fire department shall enforce the provisions of this section. The provision of section thirty shall not apply to this section.

### **CHAPTER XIV FIRE AND INTRUSION ALARMS**

The Emergency Center Advisory Committee with the approval of the Board of Selectmen, if such Committee shall not be appointed, the Board of Selectmen, is authorized to establish rules, regulations, and schedules of fees for the installation, operation, and maintenance of fire and intrusion alarm systems, including medical alert systems. No person shall install, operate, or maintain a fire intrusion, or medical alert alarm system which is connected by direct line to the Emergency Center or which incorporates a telephone dialing device programmed to dial a local police, fire or emergency telephone number automatically, or which uses exterior audible signals at the alarm location, unless such person first obtains a permit from the Emergency Center Advisory Committee, or the Board of Selectmen, and thereafter complies with applicable rules and regulations and pays any applicable fees. No person shall intentionally transmit any false fire, intrusion, or medical alert alarm. Repeated transmissions of false fire, intrusion or medical alert alarms after notice of a system malfunction from the Emergency Center Advisory Committee or the Board of Selectmen, shall constitute an intentional transmission of a false fire, intrusion, or medical alert alarm. Violation of this bylaw shall be punishable by a fine of up to but not more than one-hundred dollars (\$100) for each offense. (Amended 5/12/84)

### **CHAPTER XV REPAIR OF PRIVATE WAYS**

The Town of Wenham is authorized to make temporary repairs on private ways in accordance with the following bylaw:

1. The owners of land which abuts and has frontage on a private way open to continuous public use for (10) years or more may petition the Board of Selectmen, on a form to be provided by the town, which must be signed by at least 80 percent of the abutters of such private way, to have the town make temporary emergency or general repairs to such private way. If the Board of Selectmen determine first the public necessity will be served thereby, it may authorize such repairs to be made by the town in accordance with the provisions of this bylaw, upon the condition that the petitioning abutters agree to indemnify and hold the town harmless for

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claims for personal and property injury resulting from any defects in such private way.

2. If upon receipt of an abutter's petition the Board of Selectmen determine that public safety access and safe passage of public service vehicles on the private way so require, it may order that temporary emergency repairs be made to the private way at the town's expense. Such temporary emergency repairs shall be limited to the filling and patching of holes in the surface of such private ways or the least expensive feasible correction to a defect in drainage which has caused a blockage of such private way.

3. Temporary general repairs shall be any repairs to private ways which are not emergency repairs as provided in the preceding section, and which are reasonable and appropriate to serve the public necessity and convenience as determined by the Board of Selectmen. Temporary general repairs may include the installation and construction of drainage where required; the filling of holes in the surface of such ways and repairs to the surface materials; and the reconstruction and resurfacing of the base and surface of the way. Materials for such repairs shall, where practical, be the same as or comparable with those for the existing surfaces of such ways, but may include resurfacing the ways with bituminous materials including bituminous concrete. The cost of labor to perform temporary general repairs shall be paid by the town, and may be performed by employees of the town provided that the cost of materials is paid by the abutters of such private ways as betterments. Temporary general repairs shall not be undertaken until (1) the Finance and Advisory Board determines that the budget cost of such repair work to be paid by the town is includable in the town's operating budget for the year, or in the alternative, has been separately raised and appropriated by vote of an annual or special town meeting, and (2) the town acting through the Board of Selectmen has assessed betterments for cost of repair materials upon the owners of properties abutting and having frontage on such private way, allocated in proportion to the frontage thereof on such way, and said owners have deposited in full the projected costs of the materials required to perform such repairs.

4. The town shall not be liable on account of any damage caused by temporary emergency repairs or general repairs performed by the town pursuant to this bylaw. The town shall post warning signs at the beginning of such private way that the town is not responsible for any defects in such way, and that members of the public use the same at their own risk.

### **CHAPTER XVI HOUSE NUMBER BYLAW**

#### **A. Bylaw**

All houses, businesses, and other buildings within the Town of Wenham shall conspicuously display street identification numbers to assist emergency vehicles, postal and delivery vehicles to locate specific properties in the town.

1. It shall be the duty of each owner or occupant to provide for the display of such number in such a manner that it is visible from the street.

2. Said number shall be a minimum of three inches in height and contrasting in color.

3. In the event that the house, building or business is not visible from the street, the number shall be displayed on a post or mailbox which is visible from the street.

#### **B. Penalty**

1. Upon notice of a violation, the Board of Selectmen or Chief of Police will notify the owner or occupant in writing at the earliest convenience of either of the officials.

2. An owner or occupant shall have thirty days to correct such violation. If the owner or occupant fails to place the numbers in the manner required by the bylaw. within 30 days, the penalty

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shall be a five dollar fine for each day the numbers are not displayed. If no action is taken within 30 days of the written notice, the fine shall be retroactive to the date of the written notice being issued.

(Voted May 9, 1987)

### CHAPTER XVII ANIMAL CONTROL OFFICER FEES

A person who owns or keeps a dog, or other domesticated animal within the territorial limits of the Town of Wenham, shall be responsible for the following fees when the service of the Animal Control Officer is required in connection with any such dog or domesticated animal.

1. First service within a calendar year Free
2. Second service within a calendar year \$25
3. Third service and any subsequent service \$50
4. A pick-up fee of \$15 shall be paid to the Town for any dog retrieved by the animal control officer.
5. All fees incurred as a result of the impounding of a dog. shall be collected prior to the release of said dog from impoundment.
6. Any person who is the owner, or keeper of a dog, or a kennel within the Town of Wenham, who fails to obtain a license for said dogs or kennel, as required in Chapter 140 of the Massachusetts General Laws, within thirty days of the date on which the license is due, shall pay in addition to the fee for such license, a penalty fee of \$5 if payment is made thirty-one to sixty days after the due date; a penalty of \$10 if payment is made sixty-one to ninety days after the due date; and a penalty of \$15 if payment is made after ninety-one days following the due date. All penalty fees required under this section shall be made payable to the Town of Wenham.
7. If the animal control officer determines that a female animal in heat, even confined, is attracting other animals, thus causing a disturbance or damage to neighboring property or public area, the animal control officer may require the owner or keeper of the animal, to confine said animal, while in heat, in a kennel or to remove it from the area so that the nuisance is abated.

"Service" of the Animal Control Officer shall consist of the response of the officer to a specific location, and the removal, restraint, or impounding of the dog or domesticated animal, whether occasioned by request of a citizen, town official or otherwise. Fees shall be payable to the Town of Wenham. (Amended May 1993)

### CHAPTER XVIII WATER RESOURCES PROTECTION BYLAW

#### SECTION 1

##### **Purpose**

The purpose of this bylaw is to maintain the quality of surface water and groundwater; to maintain the level of the groundwater table and water recharge areas for existing or potential water supplies; to protect persons and property against the hazards of flood water inundation; to protect and conserve natural features, resources, and amenities for the benefit and welfare of present and future citizens of the Town of Wenham.

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This bylaw is intended to protect the water resources, wetlands, and adjoining areas in Wenham by prior review and control of activities deemed by the Conservation Commission likely to have a significant or detrimental effect upon the following values: public or private water supply, groundwater, fisheries, wildlife, wildlife habitat and the prevention and control of flooding, erosion, sedimentation, storm damage, or pollution (collectively, the "resource area values protected by the bylaw"). This bylaw is intended to utilize the Home Rule Authority of this town to protect additional resource areas, for additional values, with additional standards and procedures to augment those of the Wetlands Protection Act, G.L. Ch. 131, sec. 40 and Regulations there under, 310 CMR 10.00.

### SECTION 2

#### **Jurisdiction**

Except as permitted in writing by the Conservation Commission or as provided in this bylaw, no person shall remove, fill, dredge, discharge into, build upon, otherwise alter, pollute, or degrade the following resource areas: any freshwater wetland as determined by vegetational community, soils composition or hydrologic regime including any marsh, wet meadow, bog, or swamp; any vernal pool, any lake, stream, reservoir, river, or pond, whether intermittent or continuous, natural or manmade; land under such waters; bank or beach; land subject to flooding or inundation by groundwater, surface water or storm water (collectively the "wetland resource areas protected by this bylaw") or lands within one hundred (100) feet of any of the aforesaid resource areas (collectively "the adjacent upland resource areas protected by this bylaw").

### SECTION 3

#### **Exceptions**

The application and permit required by this bylaw shall not be required for maintaining, repairing, but not substantially changing, relocating or enlarging, any existing or lawfully located structure or facility used in the service of the public to provide electricity, gas, water, telephone, telegraph, or other telecommunication services, provided that, except in cases of public emergency, written notice and plan of work has been given to the Commission at least forty-eight (48) hours prior to commencement of work, and provided that the work is performed in accordance with standards adopted in regulations promulgated under this bylaw.

The application and permit required by this bylaw shall not apply to any emergency project necessary for public health and safety, provided that the work is to be performed by or has been ordered to be performed by an agency of the Commonwealth or a political subdivision thereof; provided that notice, oral or written, has been given to the Commission or its agent within 24 hours after commencement; provided that the Commission or its agent certifies the work as an emergency project; provided that the work is performed only for the time and place certified by the Commission for the limited purposed necessary to abate the emergency and provided that within 21 days of commencement of an emergency project a permit application shall be filed with the Commission for review as provided by this bylaw. Upon failure to meet these and other requirements of the Commission, the Commission may, after notice and a public hearing, revoke or modify an emergency project approval and order restoration and mitigation measures.

The application and permit required by this bylaw shall not be required for work performed for the normal maintenance or improvement of lands in lawful, active agricultural use, provided that the work conforms to performance standards and design specifications in regulations adopted by the Commission. Other than as stated in this section, the exceptions provided in the Wetlands Protection Act, G.L. Ch. 131, sec. 40 and Regulations, 310 CMR 10.00 shall not apply under this bylaw.

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## SECTION 4

### **Requests for Determination and Applications for Permits**

Written application shall be filed with the Commission to perform activities affecting wetland and upland resource areas protected by this bylaw. The permit application shall include such information and plans as are deemed necessary by the Commission to describe proposed activities and their potential effects on the resource areas protected by this bylaw. No activities shall commence without receiving and complying with a permit issued pursuant to this bylaw.

Any person desiring to know whether or not a proposed activity or an area is subject to this bylaw shall request in writing a determination from the Commission. Such request for determination shall contain data and plans as specified by regulations adopted under this bylaw.

The Commission in an appropriate case may accept any request, application and plans filed under M.G.L. Ch. 131 Sec. 40 as having also been filed under this bylaw. An application for a permit or a request for determination shall be hand delivered or sent by certified mail to the Commission.

The Commission may reasonably request that a separate submittal be made under this bylaw if concerns which may arise pursuant to this by-law are not addressed as part of the original submittal.

Where a permit is required hereunder in connection with the development of a large-scale ground-mounted solar photovoltaic installation pursuant to Section 10.2 of the Zoning By-Law, an application therefor shall be submitted simultaneously with an application for site plan review under said Section 10.2. If a determination of applicability is sought, a request therefore shall be submitted and a determination thereon rendered prior to submittal of an application for site plan review. (Amended 2010)

The applicant shall pay fees as specified in regulations adopted under this bylaw. The fee is in addition to that required by the Wetlands Protection Act, M.G.L. Ch. 131, sec. 40. The Commission may waive the fees, costs, and expenses for an application or request filed by a government agency, or if the project serves a public purpose as determined by the Commission.

Upon receipt of a permit application or Request for Determination, the Commission is authorized to require an applicant to pay a fee for the reasonable costs and expenses borne by the Commission for expert engineering and other consultant or legal services (“Consultant Services”) deemed necessary by the Commission to come to a final decision on the application. This fee is called the “consultant fee”. The Consultant Services may include, but are not limited to, performing or verifying the accuracy of resource area survey and delineation; analyzing resource area functions and values, including wildlife habitat evaluations, hydrogeologic and drainage analysis; and researching environmental or land use law.

The exercise of discretion by the Commission in making its determination to require the payment of a consultant fee shall be based upon its reasonable finding that additional information available through outside consultants is necessary for the making of an objective decision. Any applicant aggrieved by the imposition of, or amount of, the consultant fee, or any act related thereto, may appeal according to the provisions of the Massachusetts General Laws. The consultant fee charged to reimburse the Commission for reasonable costs and expenses shall be based on the overall project costs and shall not exceed \$15,000.

## SECTION 5

### **Notice and Hearings**

Any person filing a permit or other application or Request For Determination (“RFD”) with the Commission,

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shall give written notice by certified mail (return receipt requested) or hand delivered, to all abutters at their mailing addresses shown on the most recent applicable tax list of the assessors, including owners of land directly opposite on any public or private street or way or across a body of water (within 300 feet of the boundaries of the locus of the proposed project or within 100 feet of the property line on which the project is to be carried out, whichever is greater), including any in another municipality. The Commission may at its own discretion request that additional parties who may be affected by the proposed project (including but not necessarily limited to, those affected by or through changes in surface water runoff patterns, impact on the groundwater table, etc.) be notified according to the procedures established for abutters as described above. The notice to abutters shall have enclosed a copy of the permit application or request, with plans, or shall state where copies may be examined and obtained by abutters. An affidavit of the person providing such notice, with a copy of the notice mailed or delivered, shall be filed with the Commission. The Commission shall conduct a public hearing on any permit application, Abbreviated Notice of Resource Area Delineation (ANORAD), or RFD, with written notice given at the expense of the applicant, five business days prior to the hearing, in a newspaper of general circulation in Wenham.

The Commission shall commence the public hearing within 21 days from receipt of a completed permit application, ANORAD, or RFD unless an extension is authorized in writing by the applicant or unless a hearing is delayed beyond 21 days by conditions beyond the reasonable control of the Commission, in which case the hearing will be held as soon as reasonably possible. The Commission shall have the authority to continue the hearing to a specific date announced at the hearing for reasons stated at the hearing, which may include the need for additional information from the applicant or from others as deemed necessary by the Commission in its discretion, to solicit or respond to comments and recommendations of the boards and officials listed in the following section. In the event the applicant objects to a continuance or postponement, the hearing shall be closed and the Commission shall take action on such information as is available.

The Commission shall issue its permit, other order, or determination in writing within 21 days of the close of the public hearing thereon unless an extension is authorized in writing by the applicant. When a person requesting a determination is other than the owner, the request, the notice of the hearing and the determination itself shall be sent by the Commission to the owner as well as to the person making the request.

So as to comply with Section 22 of the Green Communities Act, amending the G.L. c.25A sec 10 (c), the review of a permit application made hereunder in connection with the development of a large-scale ground-mounted solar photovoltaic installation, as aforesaid, shall be expedited and a decision thereon shall be rendered no later than one (1) year from the date of submittal thereof. Determinations of applicability shall be made expeditiously, so as to not delay application for site plan review pursuant to Section 10.2 of the Zoning By-Law and/or for a permit hereunder.

The Commission shall combine its hearing under this bylaw with the hearing conducted under the Wetlands Protection Act, G.L. Ch. 131, §40, and Regulations, 310 CMR 10.00 in instances of concurrent jurisdiction.

### SECTION 6

#### **Coordination with Other Boards**

The Conservation Commission may choose to solicit the advice and opinions of other Town boards and officials in the course of its deliberations. Town boards and officials shall be entitled to file written comments and recommendations with the Commission at or before the public hearing. The Commission shall take any such comments and recommendations into account but shall not be bound by them. The applicant shall have the right to receive any comments and recommendations, and will be given the opportunity to respond to them at a

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hearing of the Commission, prior to final action.

Any application for a permit or determination shall at the same time be mailed or delivered to the Board of Selectmen, Planning Board, Zoning Board of Appeals, Board of Health and Building Inspector.

### SECTION 7

#### **Determinations, Permits, and Conditions**

If the Conservation Commission, after a public hearing, determines that the activities which are subject to the permit application or the land and water uses which will result therefrom, are likely to have a significant effect upon the resource area values protected by this bylaw, the Commission, within 21 days of the close of the hearing, shall issue or deny a permit for the activities requested. If it issues a permit, the Commission shall impose conditions which the Commission deems necessary or desirable to protect those values, and all activities shall be done in accordance with those conditions. The Commission shall take into account the adverse effects of loss, degradation, isolation, and replication of protected resource areas throughout the community and the watershed, resulting from past activities, permitted and exempt, and foreseeable future activities.

Where no conditions are adequate to protect those resource values, the Commission is empowered to deny a permit for failure to meet the requirements of this bylaw. It may also deny a permit; for failure to submit necessary information and plans requested by the Commission; for failure to meet the design specifications, performance standards, and other requirements in regulations of the Commission; or for failure to avoid or prevent unacceptable effects upon the resource area values protected by this bylaw. Due consideration shall be given to any demonstrated hardship on the applicant by reason of denial, as presented at the public hearing.

Lands within 200 feet of rivers, ponds and lakes, and lands within 100 feet of other resource areas, are presumed important to the protection of these resources because activities undertaken in close proximity to resource areas have a high likelihood of adverse impact upon the wetland or other resource areas, either immediately, as a consequence of construction, or over time, as a consequence of daily operation or existence of the activities. These adverse impacts from construction and use can include, without limitation, erosion, siltation, loss of groundwater recharge, poor water quality, and loss of wildlife habitat. The Commission may therefore establish performance standards for protection of such lands including without limitation strips of continuous, undisturbed vegetative cover within the 200-foot or 100-foot area, or other form of work limit or setback to buildings, roads, landscaping and other features, unless the applicant convinces the Commission that the area or part of it may be disturbed without harm to the values protected by the bylaw. The specific size and type of protected area may be established by regulations of the Commission.

In the review of areas within 200 feet of rivers, ponds and lakes, no permit issued hereunder shall permit any activities unless the applicant, in addition to meeting the otherwise applicable requirements of this bylaw, has proved by a preponderance of the evidence that (1) there is no practicable alternative to the proposed project with less adverse effects, and that (2) such activities, including proposed mitigation measures, will have no significant adverse impact on the areas or values protected by this bylaw. The Commission shall regard as practicable an alternative which is reasonably available and capable of being done after taking into consideration the proposed property use, overall project purpose (e.g., residential, institutional, commercial, or industrial purpose), logistics, existing technology, costs of the alternatives, and overall project costs.

To prevent wetlands loss, the Commission shall require applicants to avoid wetlands alteration wherever feasible; shall minimize wetlands alteration; and, where alteration is unavoidable, shall require full mitigation which shall include, at a minimum, complete replacement or restoration of the lost wetlands. The Commission

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may authorize or require replication of wetlands as a form of mitigation, but only with adequate security, professional design, and monitoring to assure success, because of the high likelihood of failure of replication.

The Commission may require a wildlife habitat study of the project area, to be paid for by the applicant, whenever it deems appropriate, regardless of the type of resource area or the amount or type of alteration proposed. The decision shall be based upon the Commission's estimation of the importance of the habitat area considering (but not limited to) such factors as proximity to other areas suitable for wildlife, importance of wildlife "corridors" in the area, or possible presence of rare species in the area. The work shall be performed by an individual who at least meets the qualifications set out in the wildlife habitat section of the Wetlands Protection Act Regulations (310 CMR 10.60).

The Commission shall presume that all areas meeting the definition of "vernal pools" under Section 9 of this bylaw, including the adjacent area, perform essential habitat functions. This presumption may be overcome only by the presentation of credible evidence which, in the judgment of the Commission, demonstrates that the basin or depression does not provide essential habitat functions. Any formal evaluation should be performed by an individual meeting the qualifications under the wildlife habitat section of the Wetlands Protection Act Regulations.

A permit shall expire three years from the date of issuance. Notwithstanding the above, the Commission in its discretion may issue a permit expiring five years from the date of issuance for recurring or continuous maintenance work, provided that annual notification of time and location of work is given to the Commission. Any permit may be renewed once for an additional one year period, provided that a request for a renewal is received in writing by the Commission prior to expiration. Notwithstanding the above, a permit may identify requirements which shall be enforceable for a stated number of years, indefinitely, or until permanent protection is in place, and shall apply to all owners of the land.

For good cause the Commission may revoke any permit, other order, determination or other decision issued under this bylaw after notice to the holder of the permit, the public, abutters, and town boards, pursuant to Sections 5 and 6, and a public hearing. Amendments to permits or determinations shall be handled in the manner set out in the Wetlands Protection Act Regulations and policies thereunder.

The Commission in an appropriate case may combine the decision issued under this bylaw with the Order of Conditions, Order of Resource Area Delineation (ORAD), Determination of Applicability or Certificate of Compliance issued under the Wetlands Protection Act and Regulations.

No work proposed in any application shall be undertaken until the permit, ORAD or determination issued by the Commission with respect to such work has been recorded in the registry of deeds or, if the land affected is registered land, in the registry section of the land court for the district wherein the land lies, and until the holder of the permit certifies in writing to the Commission that the document has been recorded. If the applicant fails to perform, the Commission may record the documents itself.

### SECTION 8

#### **Regulations and Establishment of Fees**

After public notice and public hearing, the Commission may promulgate or amend rules and regulations to accomplish the purposes of this bylaw and may establish a schedule of filing fees and consultant fees to be paid by persons making requests for determinations or applications for permits hereunder, effective when approved by majority vote of the Commission and filed with the town clerk. Failure by the Commission to promulgate

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such rules and regulations or a legal declaration of their invalidity by a court of law shall not act to suspend or invalidate the effect of this bylaw.

### SECTION 9

#### Definitions

The following definitions shall apply in the interpretation and implementation of this bylaw.

**ADJACENT UPLAND RESOURCE AREA** The term “adjacent upland resource area” shall include all lands with 100 feet of wetland resource areas as enumerated in Section 2, except for perennial streams and rivers for which the adjacent upland resource area extends for 200 feet from the top of bank, and except for vernal pools and ponds under 10,000 square feet in area for which special adjacent upland resource area definitions are described below.

**ALTER** The term “alter” shall include, without limitation, the following activities when undertaken to, upon, within or affecting resource areas protected by this bylaw:

- A. Removal, excavation, or dredging of soil, sand, gravel, or aggregate materials of any kind
- B. Changing of preexisting drainage characteristics, flushing characteristics, salinity distribution, sedimentation patterns, flow patterns, or flood retention characteristics
- C. Drainage, or other disturbance of water level or water table
- D. Dumping, discharging, or filling with any material which may degrade or otherwise impact water quality
- E. Placing of fill, or removal of material, which would alter elevation
- F. Driving of piles, erection, expansion or repair of buildings, or structures of any kind
- G. Placing of obstructions or objects in water
- H. Destruction of plant life including cutting or trimming of trees and shrubs
- I. Changing temperature, biochemical oxygen demand, or other physical, biological, or chemical characteristics of any waters
- J. Any activities, changes, or work which may cause or tend to contribute to pollution of any body of water or groundwater (including the application of pesticides and herbicides)
- K. Incremental activities which have, or may have, a cumulative adverse impact on the resource areas protected by this bylaw.
- L. Placing of materials which have a reasonable likelihood of contributing to pollution or of impacting water quality through surface run-off, groundwater infiltration or air borne transport including but not limited to yard and landscaping wastes and debris, slash, soils and sediments, woodchips, mulch, grit, gravel or other organic and inorganic materials.,

**BANK** The term “bank” shall include the land area which normally abuts and confines a water body; the lower boundary being the mean annual low flow level, and the upper boundary being the first observable break in the slope or the mean annual flood level, whichever is higher.

**PERSON** The term “person” shall include any individual, group of individuals, association, partnership, corporation, company, business organization, trust, estate, the Commonwealth or political subdivision thereof to the extent subject to town bylaws, administrative agency, public or quasi-public corporation or body, this municipality, and any other legal entity, its legal representatives, agents, or assigns.

**POND** The term “pond” shall follow the definition of 310 CMR 10.04 except that the size threshold of 10,000 square feet shall not apply.

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**RARE SPECIES** The term “rare species” shall include, without limitation, all vertebrate and invertebrate animal and all plant species listed as endangered, threatened, or of special concern by the Massachusetts Division of Fisheries and Wildlife, regardless of whether the site in which they occur has been previously identified by the Division.

**VERNAL POOL** The term “vernal pool” shall include, in addition to scientific definitions found in the regulations under the Wetlands Protection Act, any confined basin or depression not occurring in existing lawns, gardens, landscaped areas or driveways which, at least in most years, holds water for a minimum of two continuous months during the spring and/or summer, contains at least 150 cubic feet of water (approximately 1000 gallons) at some time during most years, is free of adult predatory fish populations, and provides essential breeding and rearing habitat functions for amphibian, reptile or other vernal pool community species, regardless of whether the site has been certified by the Massachusetts Division of Fisheries and Wildlife. The boundary of the resource area for vernal pools shall be 100 feet outward from the mean annual high-water line defining the depression, but shall not include existing lawns, gardens, landscaped or developed areas.

Except as otherwise required by this bylaw or regulations promulgated thereunder, definitions and regulations set forth in M.G.L. Ch. 131, sec. 40 and 310 Code of Mass. Regulations 10.00 effective November 1987 as amended from time to time shall apply.

### SECTION 10

#### **Security**

As part of a permit issued under this bylaw, in addition to any security required by any other municipal or state board, agency, or official, the Commission may require that the performance and observance of the conditions imposed thereunder (including conditions requiring mitigation work) be secured wholly or in part by one or more of the methods described below:

- A. By a proper bond or deposit of money or negotiable securities or other undertaking of financial responsibility sufficient in the opinion of the Commission, to be released in whole or in part upon issuance of a Certificate of Compliance for work performed pursuant to the permit
- B. By accepting a conservation restriction, easement, or other covenant enforceable in a court of law, executed and duly recorded by the owner of record, running with the land to the benefit of this municipality whereby the permit conditions shall be performed and observed before any lot may be conveyed. Unless postponement of the execution is due to circumstances beyond the reasonable control of the applicant and delays in conveyance would impose an unreasonable burden on the applicant.. This method shall be used only with the consent of the applicant.

### SECTION 11

#### **Enforcement**

No person shall remove, fill, dredge, build upon, degrade, or otherwise alter resource areas protected by this bylaw, or cause, suffer, or allow such activity, or leave in place unauthorized fill, or otherwise fail to restore illegally altered land to its original condition, or fail to comply with a permit or an enforcement order issued pursuant to this bylaw.

The Commission and its agents shall have the authority to enter upon privately owned land for the purpose of performing their duties under this bylaw and may make or cause to be made such examinations, surveys or

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sampling as the Commission deems necessary, subject to the constitutions and laws of the United States and the Commonwealth.

The Commission shall also have authority to enforce this bylaw, its regulations, and permits issued thereunder by enforcement orders, violation notices, non-criminal citations under G.L. Ch. 40 §21D[lh1][lh2] and civil and criminal court actions. Municipal boards and officers, including any police officer or other officer having police powers, shall have authority to assist the Commission in enforcement. Any person who violates the provisions of this bylaw may be ordered to restore the property to its original condition and take other action deemed necessary to remedy such violations, or may be fined, or both.

Upon request of the Commission, the Selectboard and town counsel may take legal action for enforcement under civil law. Upon request of the Commission, the Chief of Police may take legal action for enforcement under criminal law.

Any person who violates any provision of this bylaw, or regulation, permits, or administrative orders issued thereunder, shall be punished by a fine of not more than \$300.00. Each day or portion thereof during which a violation continues or unauthorized fill or other alteration remains in place shall constitute a separate offense, and each provision of the bylaw, regulations, permits, or administrative orders violated shall constitute a separate offense.

As an alternative to criminal prosecution in a specific case, the Commission may issue citations under the non-criminal disposition procedure set forth in G.L. Ch. 40 21D, which has been adopted by the Town of Wenham in its general bylaws.

### SECTION 12

#### **Severability**

The invalidity of any section or provision of this bylaw shall not invalidate any other section or provision thereof, nor shall it invalidate any permit or determination which previously has been issued.

### SECTION 13

#### **Burden of Proof**

The applicant for a permit shall have the burden of proof of proving by a preponderance of credible evidence that the work proposed in the permit application will not have unacceptable significant effect upon the resource area values protected by this bylaw. Failure to provide adequate evidence to the Commission supporting this burden shall be sufficient cause for the Commission to deny a permit or grant a permit with conditions.

### SECTION 14

#### **Appeals**

A decision of the Commission shall be reviewable in the Superior Court in accordance with G.L. Ch. 249, sec. 4.

### SECTION 15

#### **Relation to the Wetland Protection Act**

This bylaw is adopted under the Home Rule Amendment of the Massachusetts Constitution and the Home Rule statutes, independent of the Wetlands Protection Act, M.G.L. Ch. 131, sec. 40, and Regulations 310 CMR 10.00, there.

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## CHAPTER XIX NONCRIMINAL DISPOSITION OF CERTAIN VIOLATIONS

### SECTION 1

Authority: In accordance with the provisions of Massachusetts General Law, Chapter 40, Sec. 21D, as amended, certain violations of the following listed bylaws, rules, and/or regulations of Town officials, boards and departments may be enforced pursuant to said Section 21D, as an alternative to initiating criminal proceedings.

### SECTION 2

Enforcement: Noncriminal Disposition, when implemented, shall be enforced by the person(s) so designated in Section 4 below. The procedures shall be in accordance with Chapter 40, Section 21D.

### SECTION 3

Penalties: The specific penalties for violations of the applicable bylaws, rules and regulations shall be as listed in Section 4 below.

### SECTION 4

Applicable Bylaws, Rules or Regulations:

A. Zoning Bylaw: Notwithstanding the enforcement and penalties prescribed in the Wenham Protective Zoning Bylaw, Section XIV, and the Massachusetts General Laws Chapter 40A, the provisions of said Bylaw may be enforced by the Building Inspector by non-criminal complaint. Each day of violation shall constitute a separate offense. No enforcement shall be authorized until the enforcing officer has mailed by certified mail or delivered by hand to the offender, a written notice of violation and thirty days have expired from the date of mailing or delivery and no appeal pursuant to Chapter 40A has been filed, or if any appeal has been filed, final determination has been made favorable to the Town. The penalty for violations(s) shall be as follows:

1st Offense	Warning
2nd Offense	\$ 25
3rd Offense	\$ 50
4th Offense and each subsequent offense	\$100

B. Water Resources Protection Bylaw: In addition to the enforcement and penalties prescribed in the Wenham Water Resources Protection Bylaw, Section 9, the provisions of said bylaw may be enforced by the Conservation Commission, its agents, including the Conservation Commission Coordinator, Officers, and employees by non-criminal complaint. Each day of the violation shall constitute a separate offense. No enforcement shall be authorized until the enforcing officer has mailed, by certified mail, or delivered by hand to the offender, a written notice of violation and thirty days have expired from the date of mailing or delivery and no appeal has been filed, or if any appeal has been filed, final determination has been made favorable to the Town. The penalty for violation(s) shall be as follows:

Offense	Buffer Zone	Wetland Resource	Non-Compliance/COC
1st Offense	Warning	Warning	Warning
2nd Offense	\$ 50	\$100	\$200
3rd Offense	\$200	\$200	\$300
4th Offense	\$300	\$300	\$300

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## **CHAPTER XX FIRE LANE**

### SECTION 1

It shall be unlawful to obstruct or block a private way with a vehicle or other means as to prevent access by fire apparatus or equipment to any building.

### SECTION 2

It shall be unlawful to obstruct or park any vehicle in any fire lane, such a fire lane to be designated by the Chief of the Wenham Fire Department and posted and marked as such. Said fire lanes shall be a width of twelve (12) feet from the curbing at a sidewalk for a mall, shopping center, nursing home or school. Where no sidewalk with curbing exists the width shall be eighteen (18) feet from the building.

### SECTION 3

The building owner of record shall provide, install and maintain signs and/or markings as provided in section two (2) of the bylaw.

### SECTION 4

The bylaw shall be enforced by the Police Department of the Town of Wenham.

### SECTION 5

This bylaw shall pertain to all buildings in the Town of Wenham except buildings used for residence use, but limited to four (4) dwelling units or less.

## **CHAPTER XXI WATER USE RESTRICTION**

(Amended ATM vote 5/3/2008)

### SECTION 1

#### Authority

This Bylaw is adopted by the Town of Wenham under its police powers to protect public health and welfare and its powers under M.G.L. c.40, S21 et seq. and implements the Town's authority to regulate water use pursuant to M.G.L. c. 41, S69B. This bylaw also implements the Town's authority under M.G.L. c.40, S41A, conditioned upon a declaration of water supply emergency issued by the Massachusetts Department of Environmental Protection.

### SECTION 2

#### Purpose

The purpose of this bylaw is to protect, preserve and maintain the public health, safety and welfare whenever there is in force a State of Water Supply Conservation or State of Water Supply Emergency by providing for enforcement of any duly imposed restrictions, requirements, provisions or conditions imposed by the Town or

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by the Massachusetts Department of Environmental Protection.

## SECTION 3

### Definitions

Person shall mean any individual, corporation, trust, partnership or association, or other entity.

State of Water Supply Emergency shall mean a State of Water Supply Emergency declared by the Massachusetts Department of Environmental Protection under M.G.L. c.21G, S15-17.

State of Water Supply Conservation shall mean a State of Water Supply Conservation declared by the Town of Wenham Water Commissioners pursuant to section 4 of this bylaw.

Water Users or Water Consumers shall mean all public and private users of the Town of Wenham's public water system, and/or of groundwater within the borders of the Town of Wenham and extracted from the Ipswich River Watershed. The restrictions shall apply to all water used in the town of Wenham, to include Town water and water supplied by private wells, irrespective of any person's responsibility for billing purposes for water used at any particular facility.

Seasonal Restrictions shall prohibit outdoor watering through a sprinkler or lawn irrigation system between the hours of 9 am to 5 pm between May 1 and September 30 of each year using town water or private well water.

## SECTION 4

### Declaration of a State of Water Supply Conservation

The Town of Wenham, through its Board of Water Commissioners may declare a State of Water Supply Conservation upon determination by a majority vote of the Board that a shortage of water exists and conservation measures are appropriate to ensure an adequate supply of water to all consumers, to include fire fighting operations and to ensure compliance with the Massachusetts Department of Environmental Protection's Permitted and Registered withdrawals. Public notice of a State of Water Conservation shall be given under section 6 of this bylaw before it may be enforced.

## SECTION 5

### Restricted Water Uses:

A declaration of a State of Water Supply Conservation shall include one or more of the following restrictions, conditions, or requirements limiting the use of water as necessary to protect the water supply. The applicable restrictions, conditions or requirements shall be included in the public notice required under section 6.

a. **Odd/Even Day Outdoor Watering.** Outdoor watering by water users with odd numbered addresses is restricted to odd numbered days. Outdoor watering by water users with even numbered addresses is restricted to even numbered days.

b. **Outdoor Watering Ban:** Outdoor watering, including but not limited to use of water for irrigation and automobile, property and building washing is prohibited.

c. **Outdoor Watering Hours:** Outdoor watering is permitted only during daily periods of low demand, to be specified in the declaration of a State of Water Supply Conservation and public notice thereof.

d. **Rain/moisture Sensors:** All new automatic irrigation systems shall have a moisture or rain sensor installed as part of the system to prevent unnecessary watering. All existing automatic irrigation systems shall have a moisture or rain sensor installed as part of the system.

e. **Filling Swimming pools:** Filling of swimming pools is prohibited.

f. **Outdoor Sprinkler Use:** The use of lawn and garden sprinklers of all types, including the use of automatic sprinkler systems is prohibited. Hand watering is permitted.

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## SECTION 6

### Public Notification of State of Water Supply Conservation

Notification of any provision, restriction, requirement or condition imposed by the Town as part of a State of Water Supply Conservation shall be published in a newspaper of general circulation within the Town, by mail, or by such other means reasonably calculated to reach and inform all users of water of the State of Water Supply Conservation. Any restriction imposed under section 5 shall not be effective until such notification is provided. Notification of the State of Water Supply Conservation shall also be simultaneously provided to the Massachusetts Department of Environmental Protection.

## SECTION 7

### Termination of State of Water Supply Conservation; Notice

A State of Water Supply Conservation may be terminated by a majority vote of the Board of Water Commissioners, upon determination that the water supply shortage no longer exists. Public notification of the termination of a State of Water Supply Conservation shall be given in the same manner required by section 6.

## SECTION 8

### State of Water Supply Emergency; Compliance with DEP Orders

Upon notification to the public that a declaration of a State of Water Supply Emergency has been issued by the Department of Environmental Protection, no person shall violate any provision, restriction, requirement, condition of any order approved or issued by the Department intended to bring about an end to the State of Emergency.

## SECTION 9

### Penalties

Any person violating this bylaw shall be liable to the Town of Wenham in the amount of \$50.00 for the first violation and \$100.00 for each subsequent violation which shall inure to the Town direct. Fines shall be recovered by indictment, or on complaint before the District Court, or by non-criminal disposition in accordance with section 21D of chapter 40 of the General Laws of Massachusetts. Each day of violation shall constitute a separate offense.

The Wenham Police and the Wenham Water Department Superintendent are hereby authorized to enforce this bylaw under section 21D of Chapter 40 of the General Laws of Massachusetts.

## SECTION 10

### Severability

The invalidity of any portion or provision of this bylaw shall not invalidate any other portion or provision thereof.

## **CHAPTER XXII COMMUNITY PRESERVATION ACT/COMMUNITY PRESERVATION COMMISSION**

### Chapter 1 Establishment

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1. There is hereby established a Community Preservation Committee consisting of nine voting members pursuant to Massachusetts General Laws Chapter 44B. The Committee shall consist of the following members:
  - One member of the Historic District Commission as designated by the Commission
  - One member of the Housing Authority as designated by the Authority
  - One member of the Planning Board as designated by the Board
  - One member of the Recreation Commission as designated by the Commission
  - One member of the Conservation Commission as designated by the Commission
  - Four at-large members to be designated by the Board of Selectmen
  
2. Beginning with appointments made on or after 2016, upon the expiration of any representative member's term, that member's successor shall be appointed by the applicable commission, authority, or board for a three-year term or such shorter term for which they serve on the commission, authority, or board, which will begin on July 1 of each respective year and, in the case of at-large members appointed by the Selectmen, in order to establish a three year staggered change in at-large members, two members shall be appointed for two-year terms expiring in 2018, and two members shall be appointed for three-year terms expiring in 2019. Thereafter, all appointments shall be for three-year terms. Any member appointed for two full three-year terms shall be ineligible for reappointment until after the next succeeding annual town meeting. Any vacancy on the Community Preservation Committee shall be filled by the commission, authority or board that designated the member who creates the vacancy by designating another member in accordance with Section (1) above for the unexpired term.  
(Amended at the Annual Town Meeting 4/2/2016 and accepted by the Attorney General 7/12/2016) Effective 7/19/2016 when posted
  
3. Should any commission, authority or board designating a member for the Community Preservation Committee cease to exist for whatever reason the Board of Selectmen will determine the appropriate alternative designating commission, authority or board.

### Chapter 2. Duties

1. The Community Preservation Committee shall study the needs, possibilities and resources of the town regarding community preservation. The committee shall consult with town boards and others including, but not limited to, the Historical Commission, the Housing Authority, the Planning Board, the Conservation Commission, and the Recreation Commission in conducting such studies. As part of its studies the Committee shall hold one or more public informational hearings on the needs, possibilities and resources of the town regarding community preservation possibilities and resources, notice of which shall be posted publicly, including on the Town's web page, and published for each of two weeks preceding a hearing in a newspaper of general circulation in the town. The Committee will file an annual report on its activities to the Town Clerk.
  
2. The Community Preservation Committee shall make recommendations to the Town Meeting for the acquisition, creation and preservation of open space; for the acquisition, rehabilitation, restoration and preservation of historic resources; for the acquisition, creation and preservation of land for recreational use; for the creation, preservation and support of community housing; and for the rehabilitation or restoration of such open space, land for recreational use and community housing that is acquired or created as provided in this section. With respect to community housing, the Community Preservation Committee shall recommend, wherever possible, the reuse of existing buildings, or construction of new buildings on previously developed sites.

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3. The Community Preservation Committee may include in its recommendations to the Town Meeting a recommendation to set aside for later spending funds for specific purposes that are consistent with community preservation, but for which sufficient funds are not then available in the Community Preservation Fund to accomplish that specific purpose, or to set aside for later spending funds for general purposes that are consistent with community preservation.

### Chapter 3. Requirements for a quorum and cost estimates

The Community Preservation Committee shall not meet or conduct business without the presence of a quorum. A majority of the members of the Community Preservation Committee shall constitute a quorum. The Community Preservation Committee shall approve its actions by majority vote. Meetings will be held in accordance with the open meeting law. Recommendations to the Town Meeting shall include their anticipated costs.

### Chapter 4. Amendments

The Community Preservation Committee shall, from time to time, review the administration of this By-law, making recommendations, as needed, for changes in the By-law and in administrative practice to improve the operations of the Community Preservation Committee. The first review shall be completed at least by November 1, 2008 and subsequent reviews shall be completed in no more than five-year intervals. This Bylaw may be amended from time to time by a majority vote of the Town Meeting, provided that the amendments would not be in conflict with Chapter 44B of the Massachusetts General Laws.

### Chapter 5. Severability

In case any section, paragraph or part of this By-law be for any reason declared invalid or unconstitutional by any court of last resort, every other section, paragraph or part shall continue in full force and effect

### Chapter 6. Effective Date

This vote shall take effect and this Bylaw shall be submitted to the Attorney-General of the Commonwealth only upon certification that a majority of voters have approved a ballot question accepting sections 3 to 7, inclusive, of Massachusetts General Laws Chapter 44B. Upon approval of this Bylaw by the Attorney General of the Commonwealth, the Board of Selectmen shall request the Historic District Commission, the Housing Authority, the Planning Board, the Conservation Commission, and the Recreation Commission to designate a member to serve on the Community Preservation Committee. The Board of Selectmen will designate four at-large members of the Community Preservation Committee.

## **CHAPTER XXIII ANIMAL CONTROL BYLAW**

### A. Administration

Section 1: The Board of Selectmen shall annually appoint an Animal Control Officer who shall be responsible for the enforcement of this bylaw and the General Laws relating to the regulation of animals.

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Section 2: For purposes of this bylaw and Massachusetts General Laws, Chapter 140, section 157, the Board of Selectmen shall be the Hearing Authority.

### B. Animal Control

Section 1: The provisions of M.G.L. c.140 applicable to animal licensing and tagging are hereby incorporated herein.

Section 2: The fee to license an intact male or female dog will be \$15.00. The fee to license a spayed female or neutered male dog will be \$10.00. Personal kennels for four dogs will be \$50.00, five to ten dogs \$100.00, and more than ten dogs \$150.00. The fee to license a commercial kennel will be \$200.00, provided that no commercial kennel license shall be issued or renewed until the Animal Control Officer has inspected and approved the premises. No fee is imposed for domestic charitable corporation kennel licenses operated exclusively to protect animals from cruelty, neglect, abuse, or for relief from suffering.

Section 3: In addition to the license fees required by Section 1, there shall be assessed a late charge of twenty-five dollars (\$25.00) with respect to any dog that is not licensed before January 31st of each year.

Section 4: No dog collected under the provisions of this Bylaw, or the provisions of Massachusetts General Laws, Chapter 140, as amended, shall be released unless it has been licensed as required by this Chapter.

Section 5: The owner or keeper of a dog found in violation of this Bylaw or the provisions of Massachusetts General Laws, Chapter 140, as amended, which has been impounded, shall pay fees equal to the expenses incurred by the Town for the collection, initial handling, and daily care (if applicable) of such dogs. These fees shall be established by the Board of Selectmen, in accordance with Massachusetts General Laws, Chapter 140, as amended.

Section 6: No dog may be allowed to run free in public parks, schoolyards, recreation areas, or cemeteries.

Section 7: Any person may make a written complaint to the selectmen that any dog owned or kept within the Town is a Nuisance Dog or a Dangerous Dog, as those terms are defined in M.G.L. Chapter 140, Section 157. The Board of Selectmen shall investigate or cause to be investigated such complaint, including an examination under oath of the complainant at a public hearing in the municipality to determine whether the dog is a Nuisance Dog or a Dangerous Dog, and the Animal Control Officer shall make such order concerning the restraint or disposal of such dog as provided in M.G.L. c.140, Section 157. Violations of such orders shall be subject to the enforcement provisions of M.G.L. Chapter 140, Section 157 and 157A, which, upon conviction, may include: for a first offense, a fine of not more than \$500 or imprisonment for not more than 60 days in a jail or house of correction, or both, and for a second or subsequent offense by a fine of not more than \$1,000 or imprisonment for not more than 90 days in a jail or house of correction.

Section 8: In accordance with M.G.L. Chapter 140, Section 173A, and General Law Chapter 40, Section 21D, Non-Criminal Disposition Fines, may be used to enforce this bylaw. The Animal Control Officer, any police officer or any other person so appointed by the Board of Selectmen may issue notices of violation of bylaw. The fines for such violations, per dog, shall be as follows:

First offense: Written warning, no fine

Second offense: \$25.00

Third offense: \$50.00

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Subsequent offenses: \$ 100.00

Approved by the Special Town Meeting 11/5/2013, Accepted by the Attorney General 11/25/2013, Effective January 1, 2014

## **CHAPTER XXIV STORM WATER MANAGEMENT BYLAW BYLAW GOVERNING DISCHARGES TO THE MUNICIPAL STORM DRAIN SYSTEM**

### 1.0 PURPOSE

Increased and contaminated stormwater runoff is a major cause of impairment of water quality and flow in lakes, ponds, streams, rivers, wetlands and groundwater; contamination of drinking water supplies; alteration or destruction of aquatic and wildlife habitat; and flooding.

The regulation of illicit connections and discharges to the municipal storm drain system is necessary for the protection of the Town of Wenham's water bodies and groundwater, and to safeguard the public health, safety, welfare and the environment.

The purpose of this Bylaw is to prevent pollutants from entering the Town of Wenham's municipal separate storm sewer system (MS4), require the removal of all such illicit connections; comply with state and federal statutes and regulations relating to stormwater discharges, and to establish the legal authority to ensure compliance with the provisions of this bylaw through inspection, monitoring, and enforcement

### 2.0 DEFINITIONS

**AUTHORIZED ENFORCEMENT AGENCY:** The Board of Selectmen (hereinafter the Board) or its employees, officers or agents designated to enforce this bylaw.

**BEST MANAGEMENT PRACTICE (BMP):** An activity, procedure, restraint, or structural improvement that helps to reduce the quantity or improve the quality of stormwater runoff.

**CLEAN WATER ACT:** The Federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.) as hereafter amended.

**DISCHARGE OF POLLUTANTS:** The addition from any source of any pollutant or combination of pollutants into the municipal storm drain system or into the waters of the United States or Commonwealth of Massachusetts from any source.

**GROUNDWATER:** Water beneath the surface of the ground.

**ILLICIT CONNECTION:** A surface or subsurface drain or conveyance, which allows an illicit discharge into the municipal storm drain system, including without limitation sewage, process wastewater, or wash water and any connections from indoor drains, sinks, or toilets, regardless of whether said connection was previously allowed, permitted, or approved before the effective date of this Bylaw

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**ILLCIT DISCHARGE:** Direct or indirect discharge to the municipal storm drain system that is not composed entirely of stormwater, except as exempted in Section 7. The term does not include a discharge in compliance with an NPDES Stormwater Discharge Permit or a Surface Water Discharge Permit, or resulting from fire fighting activities exempted pursuant to Section 7 of this bylaw.

**IMPERVIOUS SURFACE:** Any material or structure on or above the ground that prevents water infiltrating the underlying soil. Impervious surface includes without limitation roads, paved parking lots, sidewalks, and rooftops.

**MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) or MUNICIPAL STORM DRAIN SYSTEM:** The system of conveyances designed or used for collecting or conveying stormwater, including any road with a drainage system, street, gutter, curb, inlet, piped storm drain, pumping facility, retention or detention basin, natural or man-made or altered drainage channel, reservoir, and other drainage structure that together comprise the storm drainage system owned or operated by the Town of Wenham.

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORMWATER DISCHARGE PERMIT:** A permit issued by United States Environmental Protection Agency or jointly with the State that authorizes the discharge of pollutants to waters of the United States.

**NON-STORMWATER DISCHARGE:** Discharge to the municipal storm drain system not composed entirely of stormwater.

**PERSON or USER:** An individual, partnership, association, firm, company, trust, corporation, agency, authority, department or political subdivision of the Commonwealth of Massachusetts or the federal government, to the extent permitted by law, and any officer, employee, or agent of such person.

**POLLUTANT:** Any element or property of sewage, agricultural, industrial or commercial waste, runoff, leachate, heated effluent, or other matter whether originating at a point or nonpoint source, that is or may be introduced into any sewage treatment works or waters of the Commonwealth of Massachusetts. Pollutants shall include without limitation:

- paints, varnishes, and solvents;
- oil and other automotive fluids;
- non-hazardous liquid and solid wastes and yard wastes;
- refuse, rubbish, garbage, litter, or other discarded or abandoned objects, ordnances, accumulations and floatables;
- pesticides, herbicides, and fertilizers;
- hazardous materials and wastes; sewage, fecal coliform and pathogens;
- dissolved and particulate metals;
- animal wastes;
- rock, sand, salt, soils;
- construction wastes and residues; and
- and noxious or offensive matter of any kind.

**PROCESS WASTEWATER:** Water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any material, intermediate product, finished product, or waste product.

**RECHARGE:** The process by which groundwater is replenished by precipitation through the percolation of

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runoff and surface water through the soil.

**STORMWATER:** Stormwater runoff, snow melt runoff, and surface water runoff and drainage.

**SURFACE WATER DISCHARGE PERMIT:** A permit issued by the Massachusetts Department of Environmental Protection (DEP) pursuant to 314 CMR 3.00 that authorizes the discharge of pollutants to waters of the Commonwealth of Massachusetts.

**TOXIC OR HAZARDOUS MATERIAL or WASTE:** Any material, which because of its quantity, concentration, chemical, corrosive, flammable, reactive, toxic, infectious or radioactive characteristics, either separately or in combination with any substance or substances, constitutes a present or potential threat to human health, safety, welfare, or to the environment. Toxic or hazardous materials include any synthetic organic chemical, petroleum product, heavy metal, radioactive or infectious waste, acid and alkali, and any substance defined as Toxic or Hazardous under G.L. Ch.21C and Ch.21E, and the regulations at 310 CMR 30.000 and 310 CMR 40.0000.

**WATERCOURSE:** A natural or man-made channel through which water flows or a stream of water, including a river, brook or underground stream.

**WATERS OF THE COMMONWEALTH:** All waters within the jurisdiction of the Commonwealth of Massachusetts, including, without limitation, rivers, streams, lakes, ponds, springs, impoundments, estuaries, wetlands, costal waters, and groundwater.

**WASTEWATER:** Any sanitary waste, sludge, or septic tank or cesspool overflow, and water that during manufacturing, cleaning or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct or waste product.

## 3.0 APPLICABILITY

This Bylaw applies to any and all flows entering the municipally owned storm drainage system, stormwater discharges, and/or indirect stormwater discharges.

## 4.0 AUTHORITY

This Bylaw is adopted under the authority granted by the Home Rule Amendment of the Massachusetts Constitution and the Home Rule Procedures Act, and pursuant to the regulations of the federal Clean Water Act found at 40 CFR 122.34.

Nothing in this Bylaw is intended to replace the requirements or authority of any other bylaw, state, federal or superceding authority.

## 5.0 ADMINISTRATION

The Authorized Enforcement Agency shall administer, implement and enforce this Bylaw. Any powers granted to or duties imposed upon the Authorized Enforcement Agency may be delegated in writing by the Authorized Enforcement Agency to employees, officers or agents of the Town Administrator, Department of Public Works, Board of Health, Conservation Commission, Planning Board or other Town Department.

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## 6.0 REGULATIONS

The Authorized Enforcement Agency may promulgate rules and regulations to effectuate the purposes of this bylaw. Failure by the Authorized Enforcement Agency to promulgate such rules and regulations shall not have the effect of suspending or invalidating this bylaw.

## 7.0 PROHIBITED ACTIVITIES

**Illicit Discharge** - No person shall dump, discharge, cause or allow to be discharged any pollutant, or non-stormwater discharge into the municipal storm drain system, watercourse, waters of the Commonwealth or abutting property.

**Illicit Connection** - No person shall construct, use, allow, maintain or continue any connection to the municipal storm drain system, regardless of whether the connection was permissible under applicable law, regulation or custom at the time of connection.

**Obstruction of the Municipal Storm Drain System** – No person shall obstruct or interfere with the normal flow of stormwater into or out of the municipal storm drain system without prior written approval from the Planning Board

## 8.0 EXEMPTIONS

This article shall not apply to any of the following non-stormwater discharges or flows provided that the source is not a significant contributor of a pollutant to the municipal storm drain system.

Waterline Flushing.

Flows from potable water sources.

Springs.

Natural flows from riparian habitats and wetlands.

Diverted stream flows.

Rising groundwater.

Uncontaminated groundwater infiltration as defined in 40 CFR 35.2005(20), or uncontaminated pumped groundwater.

Uncontaminated groundwater discharge from a residential sump pump.

Water from exterior foundation drains, footing drains (not including active or pipelines), crawl space pumps, or air conditioner condensation.

Discharges from landscape irrigation or lawn watering.

Water from individual residential car washing.

Discharges from dechlorinated swimming pool water (less than one part per million chlorine) provided it is allowed to stand for one week prior to draining, or tested for chlorine levels with a pool test kit prior to draining, and the pool is drained in such a way as to not cause a nuisance.

Discharges from street sweepers of minor amounts of water during operations.

Discharges or flows resulting from fire fighting activities.

Dye testing, provided written notification is given to the Authorized Enforcement Agency prior to the time of the test, preferably at least 72 hours prior to the start of the testing.

Non-stormwater discharges permitted under an National Pollutant Discharge Elimination System (NPDES)

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Permit, or waste discharge order administered under the authority of the United States Environmental Protection Agency, provided that the discharge is in full compliance with the requirements of the permit, waiver or order and applicable laws and regulations.

Discharges for which advanced written approval is received from the Authorized Enforcement Agency if necessary to protect public health, safety, welfare or the environment.

### 9.0 EMERGENCY SUSPENSION OF STORM DRAINAGE SYSTEM ACCESS

The Authorized Enforcement Agency may suspend municipal storm drain system access to any person or property without prior written notice when such suspension is necessary to stop an actual or threatened illegal discharge that presents or may present imminent risk of harm to the public health, safety, welfare or the environment. In the event any person fails to comply with an emergency suspension order, the Authorized Enforcement Agency may take all reasonable steps to prevent or minimize harm to the public health, safety, and welfare of the environment.

Any user that denies the Authorized Enforcement Agency reasonable access to the user's premises for the purpose of inspection, monitoring, records examination, or sampling of non-stormwater or stormwater discharges is subject to discharge termination.

Any user notified of a suspension of its discharge shall immediately stop or eliminate its contribution. In the event of a user's failure to immediately comply voluntarily with the suspension order, the Authorized Enforcement Agency may take such steps as deemed necessary, including immediate severance of the sewer or storm drain connection, to prevent or minimize damage to the municipal storm drain system, its receiving stream, or endangerment to any individuals. The Authorized Enforcement Agency may allow the user to recommence its discharge when the user has demonstrated to the satisfaction of the Authorized Enforcement Agency that the period of endangerment has passed.

### 10.0 NOTIFICATION OF SPILLS

Notwithstanding any other requirements of local, state or federal law, as soon as any person responsible for a facility or operation, or responsible for emergency response for a facility or operation has information of any known or suspected release of materials at that facility operation which is resulting or may result in illegal discharge of pollutants that person shall take all necessary steps to ensure containment, and cleanup of the release.

In the event of a release of oil or hazardous materials, the person shall immediately notify the Wenham Fire and Police Departments, Department of Public Works and Board of Health. In the event of a release of non-hazardous material, said person shall notify the Department of Public Works no later than the next business day. Written confirmation of all telephone, facsimile or in person notifications shall be provided to the Department of Public Works within three business days thereafter.

If the discharge of prohibited materials is from a commercial or industrial facility, the facility owner or operator of the facility shall retain on-site a written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

### 11.0 Enforcement

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The Authorized Enforcement Agency or an authorized agent of the Authorized Enforcement Agency shall enforce this bylaw, regulations, orders, violation notices, and enforcement orders, and may pursue all civil and criminal remedies for such violations.

Civil Relief - If a person violates the provisions of this bylaw, regulations, permit, notice, or order issued thereunder, the Authorized Enforcement Agency may seek injunctive relief in a court of competent jurisdiction restraining the person from activities which would create further violations or compelling the person to perform abatement or remediation of the violation.

Orders – The Authorized Enforcement Agency or an authorized agent of the Authorized Enforcement Agency may issue a written order to enforce the provisions of this bylaw or the regulations thereunder, which may include:

elimination of illicit connections or discharges to the MS4;  
performance of monitoring, analyses, and reporting;  
that unlawful discharges, practices, or operations shall cease and desist; and  
remediation of contamination in connection therewith.

If the enforcing person determines that abatement or remediation of contamination is required, the order shall set forth a deadline by which such abatement or remediation must be completed. Said order shall further advise that, should the violator or property owner fail to abate or perform remediation within the specified deadline, the Town of Wenham may, at its option, undertake such work, and expenses thereof shall be charged to the violator.

Within thirty (30) days after completing all measures necessary to abate the violation or to perform remediation, the violator and the property owner will be notified of the costs incurred by the Town of Wenham, including administrative costs. The violator or property owner may file a written protest objecting to the amount or basis of costs with the Authorized Enforcement Agency within thirty (30) days of receipt of the notification of the costs incurred. If the amount due is not received by the expiration of the time in which to file a protest or within thirty (30) days following a decision of the Authorized Enforcement Agency affirming or reducing the costs, or from a final decision of a court of competent jurisdiction, the costs shall become a special assessment against the property owner and shall constitute a lien on the owner's property for the amount of said costs. Interest shall begin to accrue on any unpaid costs at the statutory rate provided in G.L. Ch. 59, 57 after the thirty-first day at which the costs first become due.

Criminal Penalty - Any person who violates any provision of this bylaw, regulation, order or permit issued thereunder, shall be punished by a fine of not more than \$200. Each day or part thereof that such violation occurs or continues shall constitute a separate offense.

Entry to Perform Duties Under this Bylaw - To the extent permitted by state law, or if authorized by the owner or other party in control of the property, the Authorized Enforcement Agency, its agents, officers, and employees may enter upon privately owned property for the purpose of performing their duties under this bylaw and regulations and may make or cause to be made such examinations, surveys or sampling as the Authorized Enforcement Agency deems reasonably necessary.

Appeals - The decisions or orders of the Authorized Enforcement Agency shall be final. Further relief shall be to a court of competent jurisdiction.

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Remedies Not Exclusive - The remedies listed in this bylaw are not exclusive of any other remedies available under any applicable federal, state or local law.

## 12.0 Severability

The provisions of this bylaw are hereby declared to be severable. If any provision, paragraph, sentence, or clause, of this bylaw or the application thereof to any person, establishment, or circumstances shall be held invalid, such invalidity shall not affect the other provisions or application of this bylaw.

## 13.0 Transitional Provisions

Residential property owners shall have 90 days from the effective date of the bylaw to comply with its provisions provided good cause is shown for the failure to comply with the bylaw during that period.

## **CHAPTER XXV WENHAM HISTORICAL COMMISSION**

### SECTION 1

This bylaw shall be known and may be cited as the Wenham Historical Commission Bylaw and is adopted pursuant to Chapter 40C of the General Laws of the Commonwealth of Massachusetts, as amended.

### SECTION 2

The purpose of this bylaw is to promote the educational, cultural, economic and general welfare of the public through the preservation and protection of the distinctive characteristics of buildings and places significant in the history of the Town of Wenham or their architecture, and through the maintenance and improvement of settings for such buildings and places and the encouragement of design compatible therewith.

### SECTION 3

There is hereby established under the provisions of Chapter 40C of the General Laws a historic district to be known as the “Wenham Historic District 1972” attached to and made part of this bylaw.

### SECTION 4

There is hereby established under Chapter 40C of the General Laws, with all the powers and duties of a historic district commission under such statute a Wenham Historical Commission / Historic District Commission, consisting of seven members to be appointed in accordance with the provisions of such statute; provided, however, that in addition to the organizations which section four of such statute designates, the Wenham Village Improvement Society may submit nominees for membership in the Commission. The initial appointments to membership in the Commission shall be as follows: two members appointed for a term of one year; two members appointed for a term of two years; and three members appointed for a term of three years. Successors shall each be appointed for a term of three years. Vacancies shall be filled by appointment for the unexpired term.

### SECTION 5

Notwithstanding anything containing in this bylaw to the contrary, the authority of this commission shall not

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extend to the review of the following categories of buildings or structures or exterior architectural features in the Wenham Historic District.

- a. Terraces, walks, driveways and similar structures or any one or more of them, provided that any such structure is substantially at grade level.
- b. Storm doors and windows, screens, window air conditioners, lighting fixtures, antennas and similar appurtenances, or any one or more of them.
- c. The color of paint
- d. the color of materials used on roofs
- e. The reconstruction of substantially similar in exterior design of a building, structure or exterior architectural feature damaged or destroyed by fire or storm or other disaster, provided such reconstruction is begun within one year thereafter and carried forward with due diligence.

### SECTION 6

The commission established hereunder shall have the powers and duties of an historical commission as provided in chapter 40 section eight D of the General Laws of the Commonwealth of Massachusetts and the commission shall be entitled The Wenham Historical Commission / Historic District Commission.

### SECTION 7

In case any section, paragraph or part of this bylaw be for any reason declared invalid or unconstitutional by any court of competent jurisdiction, every other section, paragraph or part shall continue in full force and effect. (Approved at the Annual Town Meeting 4/5/2014 and accepted by the Attorney General 9/11/2014) Effective 9/16/2014 when posted

## **CHAPTER XXVI GRANT OR RENEWAL OF LICENSE/PERMIT FOR NON-PAYMENT OF TAXES/FEES**

The Town may, as authorized under the provisions of MGL Chapter 40, Section 57 and this By-Law, deny any application for, or revoke or suspend a building permit, or any local permit including renewals and transfers issued by any board, officer, department for any person, corporation or business enterprise, who has neglected or refused to pay any local taxes, fees, assessments, betterments or any other municipal charges, including amounts assessed under the provisions of MGL Chapter 40, Section 21D or with respect to any activity, event or other matter which is the subject of such license or permit and which activity, event or matter is carried out or exercised or is to be carried out or exercised on or about real estate whose owner has neglected or refused to pay any local taxes, fees, assessments, betterments or any other municipal charges.

- (a) The tax collector or other municipal official responsible for records of all municipal taxes, assessments, betterments and other municipal charges, hereinafter referred to as the tax collector, shall annually furnish to each department, board, commission, or division, hereinafter referred to as the licensing authority, that issues licenses or permits including renewals and transfers, a list of any person, corporation, or business enterprise, hereinafter referred to as the party, that has neglected or refused to pay any local taxes, fees, assessments, betterments or other municipal charges for not less than a twelve month period, and that has not filed in good faith a pending application for an abatement of such tax or a pending petition before the appellate tax board.

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- (b) The licensing authority may deny, revoke or suspend any license or permit, including renewals and transfers of any party whose name appears on said list furnished to the licensing authority from the tax collector or with respect to any activity, event or other matter which is the subject of such license or permit and which activity, event or matter is carried out or exercised or is to be carried out or exercised on or about real estate owned by any party whose name appears on said list furnished to the licensing authority from the tax collector; provided, however, that written notice is given to the party and to the tax collector, as required by the applicable provisions of law, and the party is given a hearing, to be held not earlier than fourteen days after said notice. Said list shall be prima facie evidence for denial, revocation or suspension of said license or permit to any party. The tax collector shall have the right to intervene in any hearing conducted with respect to such license denial, revocation or suspension. Any findings made by the licensing authority with respect to such license denial, revocation or suspension shall be made only for the purposes of such proceeding and shall not be relevant to or introduced in any other proceeding at law, except for any appeal from such license denial, revocation or suspension. Any license or permit denied, suspended or revoked under this section shall not be reissued or renewed until the license authority receives a certificate issued by the tax collector that the party is in good standing with respect to any and all local taxes, fees, assessments, or other municipal charges, payable to the municipality as of the date of the issuance of said certificate.
- (c) Any party shall be given an opportunity to enter into a payment agreement, thereby allowing the licensing authority to issue a certificate indicating said limitations to the license or permit and the validity of said license or permit shall be conditioned upon the satisfactory compliance with said agreement. Failure to comply with said agreement shall be grounds for the suspension or revocation of said license or permit; provided, however, that the holder be given notice and a hearing as required by applicable provisions of law.
- (d) The Board of Selectmen may waive such denial, suspension or revocation if it finds that there is no direct or indirect business interest by the property owner, its officers or stockholders, if any, or members of their immediate family, as defined in MGL Chapter 268A, Section 1 in the business or activity conducted in or on said property

This By-Law shall not apply to the following licenses: open burning (c.48 s.13); bicycle permits (c.85 s.11A); sales or articles for charitable purposes (c.101 s.33); children's work permits (c.149 s.69); clubs, associations dispensing food or beverage licenses (c.140 s.21E); dog licenses (c.140s.137); fishing, hunting, or trapping (c.131 s.12); marriage licenses (c.207 s.28); and theatrical events, public exhibitions (c.140 s.181).

(Approved at the Annual Town Meeting 4/2/2016 and accepted by the Attorney General 7/12/2016)

Effective 7/19/2016 when posted

### **CHAPTER XXVII RESIDENCY REQUIREMENT FOR MEMBERS OF APPOINTED MULTIPLE-MEMBER BODIES**

#### **SECTION 1 – Residency Requirement**

Only residents of the Town of Wenham shall be eligible for appointment as voting members of any multiple-member body of the Town of Wenham. In the event an appointee removes from the Town during said term of appointment, their appointing authority shall declare the office vacant, except as provided in Section 2, below.

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### SECTION 2 - Exceptions

The provisions of this By-Law shall not apply to:

- (a) An ex-officio or non-voting member of a multiple-member body, including any non-resident town officer or employee representing the Town of Wenham in such capacity;
- (b) A member of a multiple-member body who removes from the Town of Wenham while that body is conducting an adjudicatory hearing, provided that the appointing authority, at the request of the chair of such multiple-member body, authorizes the member to continue to serve until the hearing is concluded and a decision has been made.
- (c) Any non-resident incumbent member of a multiple-member body serving as of the effective date of this by-law for the remainder of their appointed term; provided that they shall thereafter be subject to the requirements of Section 1.

(Approved at the Annual Town Meeting 4/2/2016 and accepted by the Attorney General 7/12/2016)  
Effective 7/19/2016 when posted

**TOWN OF WENHAM  
PLANNING BOARD  
Administrative Rules and Regulations  
Adopted January 14, 2016**

**ARTICLE I. GENERAL**

**Section 1. Purpose and Scope**

These Rules are adopted by the Wenham Planning Board (hereinafter referred to as the “Board”) as authorized by Massachusetts General Laws, Chapter 40A, Section 9, and the Town of Wenham Zoning Bylaw (hereinafter referred to as the “Zoning By-Law) Section 13.3.3, for the purpose of establishing uniform procedures for conducting the business of the Board which, in general, but without limitation, shall consist of hearing all applications coming under its jurisdiction as set forth in the Zoning By-Law and other By-Laws. Such matters of original jurisdiction, subject to conformance with these Rules, will in general consist of the following:

- (a) Receive and act upon, as a special permit granting authority, all applications for special permits as authorized by the Zoning By-Law; and
- (b) Receive and act upon all applications for site plan approval pursuant to Section 13.5.

The Board also has jurisdiction over the division and subdivision of land as set forth in G.L. c. 41, s. 81K - 81GG, and has adopted Subdivision Rules and Regulations in a separate document.

**Section 2. Petitioner or Applicant**

An application for a special permit or for site plan approval may be brought by a property owner, a tenant, a licensee, a prospective purchaser or other applicant provided that documentation from the owner certifying the petitioner’s legal interest and right to file accompanies the petition or application. The applicant shall file with the Town Clerk who shall transmit it forthwith to the Board. It is strongly recommended that all new applications be first reviewed by the Building Inspector or the Town Planner to assure their correctness, completeness and clarity.

**ARTICLE II. ORGANIZATION**

**Section 1. Elections**

At the first regular meeting following the qualification of annual electee(s), the Board shall elect a chairperson and vice-chairperson. Each shall serve until a successor is duly elected.

**Section 2. Chairperson - Powers and Duties**

The chairperson shall preside over all hearings and meetings of the Board. Subject to the rules as stated herein, he/she shall decide all points of order, unless overruled by a majority of the Board in session at the time. The chairperson shall appoint such committees as may be deemed necessary or desirable from time to time.

In addition to powers granted by Massachusetts General Laws and the Zoning By-Law, and subject to these Rules and further instructions of the Board, the chairperson shall supervise the work of the clerk, arrange for necessary help, and exercise general supervision over the Board’s activities.

**Section 3. Vice-Chairperson**

The vice-chairperson shall preside over hearings and meetings and perform the duties of the chairperson during the absence or unavailability of the chairperson.

**Section 4. Clerk**

A clerk shall be appointed by the Board, and subject to the direction of the Board and its chairperson, shall undertake all of the clerical work of the Board including all correspondence of the Board, sending of all notices required by law and the rules and orders of the Board, receive and scrutinize all applications for compliance with the rules of the Board, keep dockets and minutes of the Board's proceedings, compile all required records, maintain necessary files and indices and call the roll at all Board meetings.

**Section 5. Quorum**

A quorum for the purpose of conducting public hearings and transacting other business except voting on appeals, petitions and applications as provided herein, shall consist of three (3) members.

**Section 6. Regular Meetings**

Regular meetings of the Board shall be held on the second Thursday of each month, as necessary at times determined by the Board at a place specified in the meeting notice.

**Section 7. Special Meetings**

Special meetings may be called by the chairperson or at the request of two members. Written notice thereof shall be given to each member at least forty-eight (48) hours before the time set, except that announcement of a special meeting at any meeting attended by all members shall be sufficient notice. Notices shall be posted publicly as required by law.

**Section 8. Absences**

Pursuant to Town Meeting's acceptance of Massachusetts General Laws, Chapter 39, Section 23D, no member of the Board shall be disqualified from voting on any matter solely due to said member's absence from no more than a single session of the hearing at which testimony or other evidence is received; provided, however, that before any such vote, said member shall certify in writing that he/she has examined all evidence received at the missed session, which evidence shall include an audio or video recording of the missed session or a transcript thereof, such certification to be part of the record of the hearing.

**ARTICLE III. SUBMISSION OF PETITION OR APPLICATION**

**Section 1. Application Form**

Every petition and application for action by the Board shall be made on an official application form, entitled "Planning Board - Application for Hearing," which shall be furnished by the clerk upon request. Any communication, purporting to be an application, shall be treated as mere notice of intention to seek Board action, until such time as it is made on the official application form and payment of the applicable filing fee. To be a complete form, all information called for by the form shall be furnished by the applicant in the manner therein prescribed and in precise language identifying the applicable provisions of the Zoning By-Laws and the specific nature of the appeal, petition or application. The form to be used is hereby made a part of these Rules.

**Section 2. Filing Period for Appeal**

All applications may be filed at the discretion of the applicant. Applications to be heard at a regular meeting of the Board must be filed no later than the Thursday three weeks preceding the regular meeting.

**Section 3. Submissions**

Seven (7) copies of the application form shall be submitted and each application shall be accompanied by a plot plan prepared by and under the seal of a registered engineer or registered land surveyor showing current conditions and such other plans, sketches or diagrams as are needed to show clearly the nature of the specific request being made by the petitioner. The size of the document(s) shall be 8-1/2" x 11" or 11" x 17", drawn to a scale of 1" = 40' or such other size and scale as the Building Inspector might approve during the review discussion. The plans shall have a north point, names of streets, zoning districts,

property lines, dimensions of the subject lot, locations of buildings on the lot, parking areas, driveways and all other information pertinent to the application as required by the Zoning By-Law, other By-Laws or Rules and these Rules. All changes requested by the applicant shall be clearly identified.

#### **Section 4. Filing Fees and Cost of Public Notice**

The following administrative fees, pursuant to G.L. c. 44, s. 53E1/2, shall be provided to the Board with the submittal of the application:

- (a) An application for a special permit associated with a single family residence \$ 250
- (b) An application for a special permit for residential project in Senior Housing Overlay District, Independent Living Overlay District or Flexible Development \$ 1,500 plus \$200/ unit
- (c) An application for a special permit for a Personal Wireless Service \$ 2,000
- (b) An application for site plan approval \$ 1,000
- (c) An application to amend, modify or transfer a special permit \$100
- (d) All fees are established to cover the cost of and to otherwise defray reasonable expenses incurred by the Board in processing petitions and applications filed with the Board.
- (e) An application shall not be deemed filed until filing fee set forth above have been paid to the Clerk. In the event that the check does not clear, the application shall be dismissed as incomplete pursuant to Section 6, below, and the materials shall be returned to the applicant.
- (f) In addition to the above stated filing fees, the applicant shall be responsible to pay the cost of publishing public notice of any hearing in a newspaper. The clerk shall prepare the notice and arrange for publication. The newspaper may send an invoice directly to the applicant or through the clerk. The applicant shall pay any such invoice promptly upon receipt and failure to make timely payment shall be grounds for the Board to withhold a decision or deny an application.
- (g) The Town shall be exempt from payment of a filing fee, but shall pay the costs of publication.

#### **Section 5. Outside Consultants and Fees**

The Board may hire outside consultants for review and analysis of any appeal, petition, or application when the Board determines it appropriate. The cost for the outside consultants shall be borne by the applicant. The Board shall follow the requirements of the Uniform Procurement Act, G.L.c.30B, §4, for consultant services less than \$25,000.00.

The Board will select the consultant after reviewing both the bid and any comments received from the applicant pursuant to these Rules, but it normally will not formally award the contract until the review fee has been paid. If the applicant fails to pay the review fee within ten days of receiving written notification of selection of a bidder, the Board may deny the application.

Pursuant to G.L. c. 44, §53G, the Board, through this regulation, provides for an applicant's payment of the fees for outside consultants as set forth below:

- (a) When conducting any hearing pursuant to these Rules (the subject of which is hereinafter referred to as a "proposal"), the Board may determine that the assistance of outside consultants is warranted due to:
  - (1) the size, scale or complexity of the proposal;
  - (2) the complexity of particular technical issues;
  - (3) the number of housing units or square feet proposed; and
  - (4) the size and character of the site,

(b) The Board may require that the applicant(s) pay a review fee consisting of the reasonable costs incurred by the Board for the employment of outside consultants engaged by the Board to assist in the review of an application.

(c) In hiring outside consultants, the Board may engage engineers, planners, traffic consultants, attorneys, housing specialists and financial analysts, and/or other appropriate outside consultants who can assist the Board in reviewing and analyzing the proposal. The minimum qualifications shall consist either of an educational degree in, or related to, the field at issue of three or more years of practice in the field as issue or a related field.

(d) Funds received by the Board pursuant to this section shall be deposited with the Town Treasurer who shall establish a special account for this purpose in accordance with the provisions of Chapter 44, Section 53G of the General Laws. Expenditures from this special account may be made at the directions of the Board in connection with the hearing of a specific proposal for which a review fee has been collected from the applicant without further appropriation. Failure of an applicant to pay a review fee shall be grounds for denial of the application.

(e) Review fees may only be spent for services rendered in connection with the specific proposal from which they were collected. Accrued interest may also be spent for this purpose. At the completion of the Board's review of a proposal, any excess amount in this account, including interest, attributable to a specific project, shall be repaid to the applicant or the applicant's successor in interest. A final report of said account shall be made available to the applicant or the applicant's successor in interest. For the purpose of this regulation, any person or entity claiming to be an applicant's successor in interest shall provide the Board with documentation establishing such succession in interest.

(f) Prior to paying the review fee, the applicant may appeal the selection of an outside consultant(s) to the Board of Selectmen. The grounds for such an appeal shall be limited to claims that the consultant(s) selected has a conflict of interest or does not possess the minimum, required qualifications.

(g) The written appeal should specify the nature of the conflict of interest and detail the lack of required qualifications. A copy of the appeal shall be simultaneously provided to the Board.

(h) The time limit for the Board's action on the proposal shall be extended by the duration of any administrative appeal to the Board of Selectmen. In the event that the Board of Selectmen makes no decision regarding the appeal within thirty days following the filing of such appeal, then the selection of the Planning Board shall stand.

#### **Section 6. Dismissal of Incomplete Filings**

The Board may dismiss an application if the application form is not complete, the submissions required by Section 3 are not made, or the check does not clear. Such dismissal may be made without a hearing on the merits and shall be deemed a withdrawal without prejudice to refile when the application and submissions are complete.

#### **Section 7. Names and Addresses of Abutters**

After the petition or application is filed, the clerk of the Board shall obtain immediately a list of the names and addresses of all parties in interest including the petitioner, abutters, owners of land directly opposite on any public or private street or way and abutters to the abutters within three hundred (300) feet of the property line of the applicant, as they appear on the most recent applicable tax list, as defined by Massachusetts General Laws, Chapter 40A, Section 11, and the Zoning By-Law. The assessors shall certify to the Board that list of names and addresses of all parties in interest.

### **ARTICLE IV. HEARINGS**

#### **Section 1. Notice**

Notice of hearings shall be advertised as required by the provisions of General Laws, Chapter 40A, and the Zoning By-Law. In addition, a copy of the advertised notice shall be sent by mail, at least seven (7) days

prior to the date of the hearing, postage prepaid, or delivered, to all parties in interest and to the Board of Selectmen, Building Inspector, Department of Public Works, Conservation Commission and Town Clerk, and where determined appropriate by the Board, other Town boards and officials.

## **Section 2. Hearings to be Public**

All hearings shall be open to the public and shall be conducted in accordance with the Massachusetts Open Meeting Law, Massachusetts General Laws, Chapter 30A, Sections 18 through 25.

## **Section 3. Representation and Absence**

An applicant may appear in his/her own behalf or be represented by an agent or attorney. In the absence of an appearance without due cause indicated by the applicant, the Board shall decide on the matter either using the information it has otherwise received or dismissing the application, at its discretion, with or without prejudice.

## **Section 4. Continuances**

A continuance may be requested by an applicant by written request submitted to the clerk in advance of a hearing or orally at a hearing. The Board may, in its discretion, allow or deny any request for a continuance. Unless notified in writing that a continuance has been granted, an applicant must appear at a scheduled hearing. Any continuance granted upon request of an applicant shall constitute an agreement by the applicant to extend the time limits for actions by the Board by the duration of the continuance and such agreement, at the request of the Board, shall be set forth in writing.

## **Section 5. Hearing Procedure**

- (a) Hearings will start at the stated time in the notice unless delayed because of prior hearings.
- (b) At the hearing any party whether entitled to notice thereof or not may appear in person or by agent or by attorney.
- (c) At the hearing the chairperson may summon witnesses and call for the production of papers. The Board shall retain any record which has been introduced in evidence, for reference in the consideration of the case.
- (d) No person shall address a hearing of the Board without leave of the chairperson, and all persons shall, at the request of the chairperson, be silent. If a person, after warning from the chairperson, persists in disorderly behavior, the chairperson may order him/her to withdraw from the hearing, and, if he/she does not withdraw, may order a constable or any other person to remove him/her and confine him/her in some convenient place until the hearing is adjourned.
- (e) The chairperson may close the hearing immediately if, in his/her opinion, these Rules are being violated and/or the hearing is becoming disorderly.
- (f) The chairperson will open each hearing by reading, or causing to be read, the notice as advertised.
- (g) The applicant or his/her representative will then present his/her case, stating fully the reason(s) why the application should be granted.
- (h) When the applicant or his/her representative has concluded the presentation, the chairperson will allow all those in favor of the matter under consideration to speak. Those who wish to speak will rise, address the chairperson, give their names and addresses, then proceed.
- (i) When all those in favor have spoken, the chairperson will then allow those in opposition a similar opportunity to be heard.
- (j) Rebuttals may only be allowed at the discretion of the chairperson.
- (k) Similarly, no cross-examination will be allowed, although questions seeking information and deemed relevant by the Board may be allowed at its discretion.

- (l) Members of the Board who are hearing the case may direct appropriate questions during the hearing.
- (m) When all facts have been presented, the chairperson, after motion, will close the hearing and inform the petitioner or his/her representative and others present that they will be notified of the Board's decision.
- (n) In the event an applicant fails to appear at a scheduled hearing, the Board may continue the matter or, in its discretion, dismiss the matter. Unless the Board indicates otherwise in its decision, any such dismissal shall be deemed a withdrawal without prejudice to refile the application.

**Section 6. Information to be Furnished to the Board**

An applicant may submit written materials in advance of the hearing, at the hearing or at any time prior to close of evidence at the hearing. With the Board's permission, an applicant may submit material subsequent to the close of the hearing, such as a revised plan, but only if the substance reflected in such material was presented at the public hearing and the Board does not rely on such material as evidence. Any legal memorandum must be submitted at least 14 days in advance of the hearing unless the Board sets a different deadline. Any applicant may submit a proposed decision to the Board. All submissions shall be made to the clerk.

In the case of a special permit, the following criteria set forth in Section 13.4.3 of the Zoning By-Law should be clearly identified and factually supported, in addition to any criteria set forth in any other applicable provision of the Zoning By-Law:

Written determination that the adverse effects of the proposed use will not outweigh its beneficial impacts to the Town or the neighborhood, in view of the particular characteristics of the site, and of the proposal in relation to that site. In addition to any specific factors that may be set forth in this By-Law, the determination shall include consideration of each of the following:

- 1) Community needs which are served by the proposal;
- 2) Traffic flow and safety, including parking and loading;
- 3) Adequacy of utilities and other public services;
- 4) Neighborhood character and social structures;
- 5) Impacts on the natural environment; and
- 6) Potential fiscal and economic impact, including impact on town services, tax base, and employment .

In the case of site plan approval, the following criteria set forth in Section 13.5.7 of the Zoning By-Law should be clearly identified and factually supported, in addition to any criteria set forth in any other applicable provision of the Zoning By-Law:

Any new building construction or other site alteration shall provide adequate access to each structure for fire and service equipment and adequate provision for utilities and storm water drainage consistent with the functional requirements of the Planning Board's Subdivision Rules and Regulations. New building construction or other site alteration shall be designed in the Site Plan, after considering the qualities of the specific location, the proposed land use, the design of building form, grading, egress points, and other aspects of the development, so as to:

- 1) Minimize the volume of cut and fill, the number of removed trees 6" caliper or larger, the length of removed stone walls, the area of wetland vegetation displaced, the extent of storm water flow increase from the site, soil erosion, and threat of air and water pollution;
- 2) Maximize pedestrian and vehicular safety both on the site and egressing from it;
- 3) Minimize obstruction of scenic views from publicly accessible locations;
- 4) Minimize visual intrusion by controlling the visibility of parking, storage, or other outdoor service areas viewed from public ways or premises residentially used or zoned;
- 5) Minimize glare from headlights and lighting intrusion;
- 6) Minimize unreasonable departure from the character, materials, and scale of buildings in the vicinity, as viewed from public ways and places;

- 7) Minimize contamination of groundwater from on-site waste-water disposal systems or operations on the premises involving the use, storage, handling, or containment of hazardous substances; and
- 8) Ensure compliance with the provisions of this Zoning By-Law, including parking and landscaping.
- 9) Site plan review for an educational use, religious use, or child care center, otherwise subject to GL c 40A s 3, shall be limited in scope to the determination of “reasonable regulations concerning the bulk and height of structures and determining yard sizes, lot area, setbacks, open space, parking and building coverage requirements” as set forth in the statute.

In the case of the management of stormwater runoff from construction activities that discharge to the municipal separate storm sewer system and result in a land disturbance of equal to or greater than one acre, or less than one acre if part of a larger common plan of development that disturb one or more acres of land, applicants must submit the following: (1) a plan to control wastes generated by the construction activity on the construction site, (2) an Erosion and Sedimentation Control Plan, and (3) a plan to construct Stormwater Management Measures.

#### A. PLAN TO CONTROL WASTES

An applicant must develop a plan to control wastes that lists the construction and waste materials expected to be generated or stored on the construction site. These wastes include, but are not limited to: discarded building materials, concrete truck washout, chemicals, litter, sanitary waste and material stockpiles. An applicant must also describe in narrative form the Best Management Practices that it will utilize to reduce pollutants from these materials including storage practices to minimize exposure of the materials to stormwater.

#### B. EROSION AND SEDIMENTATION CONTROL PLAN

An applicant must describe its plan for properly stabilizing the site before construction begins and the BMPs that it will use during construction to minimize erosion of the soil and sedimentation of stormwater. These BMPs should include stabilization practices such as seeding, mulching, preserving trees and vegetative buffer strips, contouring, earth dikes, silt fences, drainage swales, sediment traps, check dams, and subsurface or pipe slope drains. BMPs utilized shall be appropriate for the conditions at the construction site in accordance with the Massachusetts Stormwater Handbook. The requirements of the Erosion and Sedimentation Control Plan are to:

1. Minimize total area of disturbance;
2. Sequence activities to minimize simultaneous areas of disturbance;
3. Minimize peak rate of runoff in accordance with the Massachusetts Stormwater Handbook Volume 2;
4. Minimize soil erosion and control sedimentation during construction, provided that prevention of erosion is preferred over sedimentation control;
5. Divert uncontaminated water around disturbed areas;
6. Maximize groundwater recharge;
7. Install and maintain all erosion and sediment control measures in accordance with the manufacturer’s specifications and good engineering practices;
8. Prevent off-site transport of sediment;
9. Protect and manage on and off-site material storage areas (overburden and stockpiles of dirt, borrow areas, or other areas used solely by the permitted project are considered a part of the project);
10. Comply with applicable federal, state and local laws and regulations including waste disposal, sanitary sewer or septic system regulations, and air quality requirements, including dust control;
11. Prevent significant alteration of habitats mapped by the Massachusetts Natural Heritage & Endangered Species Program as endangered, threatened or of special concern, estimated habitats of rare wildlife and certified vernal pools, and priority habitats of rare species from the proposed activities;
12. Institute interim and permanent stabilization measures, which shall be instituted on a disturbed area as soon as practicable but no more than 14 days after construction activity has temporarily or permanently ceased on that portion of the site; and
13. Prevent off-site vehicle tracking of sediments.

#### C. SITE PLAN

The Site Plan that is submitted must contain at least the following information:

1. Names, addresses and telephone numbers of the person(s) or firm(s) preparing the plan.
2. Title, date, north arrow, scale, legend and locus map.
3. Location and description of natural features including watercourses and water bodies, wetland resource

areas and all floodplain information including the 100-year flood elevation based upon the most recent Flood Insurance Rate Map (or as calculated by a professional engineer for areas not assessed on those maps) located on or adjacent to the construction site.

4. A description and delineation of existing stormwater conveyances and impoundments located on the construction site with their point of discharge noted.

5. Location and description of existing soils and vegetation including tree lines, shrub layer, ground cover and herbaceous vegetation and trees with a caliper twelve (12) inches or larger with run-off coefficient for each.

6. Habitats mapped by the Massachusetts Natural Heritage & Endangered Species Program as endangered, threatened or of special concern, estimated habitats of rare wildlife and certified vernal pools, and priority habitats of rare species located on or adjacent to the construction site.

7. Lines of existing abutting streets showing drainage and driveway locations and curb cuts.

8. Surveyed property lines of the construction site showing distances and monument locations, all existing and proposed easements, rights-of-way, and other encumbrances, the size of the entire construction site and the delineation and number of square feet of the land area that is to be disturbed.

9. Proposed improvements including location of buildings or other structures and impervious surfaces (such as parking lots).

10. An evaluation of the use of possible low-impact development techniques, and details of any measures employed. Measures could include any of the following:

a. Steps taken to minimize land disturbance;

b. Preservation of natural drainage features;

c. Minimizing sediment runoff with vegetative strips, diversions swales, sediment traps, check dams, stabilized construction entrances, dust control, silt fences, or other means;

d. Stormwater BMPs that infiltrate 90% of annual storm events;

e. Landscaping that promotes on-site water retention and infiltration; and

f. Minimizing widths of streets and driveways to reduce creation of impervious area.

11. Topographical features including existing and proposed contours at intervals of no greater than two (2) feet with spot elevations provided when needed.

12. The existing site hydrology including drainage patterns and approximate slopes anticipated after major grading activities.

13. Location of the MS4 with relation to the construction site.

14. Identification of outfalls which are located on the construction site.

15. Stormwater discharge calculations prepared and certified by a Registered Professional Engineer describing the volume of stormwater that presently discharges from the construction site and the estimated volume post-development.

16. Identification of any existing stormwater discharges emanating from the construction site and discharging into the MS4 for which a NPDES Permit has been issued (include Permit number).

17. A list of water bodies that will receive stormwater discharges from the construction site with the location of drains noted on the map. A brief description of known water quality impacts and whether the water bodies receiving such stormwater discharges have:

a. Been assessed and reported in reports submitted by the Massachusetts Department of Environmental Protection to EPA pursuant to Section 305 (b) of CWA and

b. Been listed as a Category 5 Water (Waters Requiring a Total Maximum Daily Load (TMDL)) by DEP under 303(d) of the CWA.

#### D. SITE INSPECTION AND SUPERVISION

1. Pre-construction Meeting. Prior to starting clearing, excavation, construction, or land disturbing activity the applicant, the applicant's technical representative, the general contractor or any other person with authority to make changes to the project, shall meet with the Board or its designated agent, to review the permitted plans and their implementation.

2. Board Inspection. The Board or its designated agent shall make inspections as hereinafter required and shall either approve that portion of the work completed or shall notify the permittee wherein the work fails to comply with the Stormwater Permit as approved. The Permit and associated plans for grading, stripping, excavating, and filling work, bearing the signature of approval of the Board, shall be maintained at the site during the progress of the work. In order to obtain inspections, the permittee shall notify the Board at least two (2) working days before each of the following events:

a. Erosion and sediment control measures are in place and stabilized;

b. Site Clearing has been substantially completed;

- c. Rough Grading has been substantially completed;
- d. Final Grading has been substantially completed;
- e. Close of the Construction Season; and
- f. Final Landscaping (permanent stabilization) and project final completion.

3. Permittee Inspections. The permittee or his/her agent shall conduct and document inspections of all control measures) no less than weekly or as specified in the permit, and prior to and following anticipated storm events. The purpose of such inspections will be to determine the overall effectiveness of the control plan, and the need for maintenance or additional control measures. The permittee or his/her agent shall submit monthly reports to the Board or designated agent in a format approved by the Board.

All inspections shall be performed in accordance with the written standard operating procedures employed by the Town of Wenham.

E. Enforcement. The Board or an authorized agent of the Board shall enforce this Section, regulations, orders, violation notices, and enforcement orders, and may pursue all civil and criminal remedies for such violations.

1. Orders

- a. The Board or an authorized agent of the Board may issue a written order to enforce the provisions of this Section or the regulations thereunder, which may include:
  - (i) a requirement to cease and desist from the Construction Activity until there is compliance with the provisions of the land-disturbance permit;
  - (ii) maintenance, installation or performance of additional erosion and sediment control measures;
  - (iii) monitoring, analyses, and reporting;
  - (iv) remediation of erosion and sedimentation resulting directly or indirectly from the land-disturbing activity.
- b. If the enforcing person determines that abatement or remediation of erosion and sedimentation is required, the order shall set forth a deadline by which such abatement or remediation must be completed. Said order shall further advise that, should the violator or property owner fail to abate or perform remediation within the specified deadline, the Town of Wenham may, at its option, undertake such work, and the property owner shall reimburse the Town of Wenham's expenses.
- c. Within thirty (30) days after completing all measures necessary to abate the violation or to perform remediation, the violator and the property owner shall be notified of the costs incurred by the Town of Wenham, including administrative costs. The violator or property owner may file a written protest objecting to the amount or basis of costs with the Board within thirty (30) days of receipt of the notification of the costs incurred.

2. Any person that violates any provision of this Section may be punished, under MGL C. 40 s 21D as a non-criminal offense, by fines of:

- a. First offense: \$100
- b. Second offense: \$200
- c. Additional offenses: \$300 each

Or by criminal complaint at the appropriate venue. Each day or portion thereof during which a violation continues shall constitute a separate offense.

3. Appeals. The decisions or orders of the Board shall be final. Further relief shall be to a court of competent jurisdiction.

4. Remedies Not Exclusive. The remedies listed in this Section are not exclusive of any other remedies available under any applicable federal, state or local law.

**ARTICLE V. ACTIONS BY THE BOARD**

**Section 1. Voting Requirements**

The concurring vote of four (4) members of the Board shall be necessary to decide in favor of the applicant on any special permit application, except that any three (3) members may approve an application for site plan

approval. The Board shall cause to be made a detailed record of its proceedings, showing the vote of each member upon each question, or, if absent, or failing to vote, indicating such fact, and setting forth clearly the reason or reasons for its decisions, and of its other official actions, copies of all of which shall be immediately filed in the office of the Town Clerk and shall be a public record.

### **Section 2. Withdrawal**

An application may be withdrawn by notice in writing to the clerk at any time prior to the hearing by the Board. After commencement of a hearing, an application may be withdrawn only with the consent of the Board which shall determine whether the withdrawal is without prejudice to refiling at any time or with prejudice subjecting the applicant to the provisions of Section 4 below.

### **Section 3. Reconsideration**

When an application has been voted upon and the meeting adjourned, there shall be no reconsideration of a decision of the Board.

### **Section 4. Repetitive Petition**

In order to have any application which has been unfavorably acted upon by the Board reconsidered by the Board within two (2) years, the applicant must follow the procedure outlined in Massachusetts General Laws, Chapter 40A, and the Zoning By-Law.

### **Section 5. Decisions**

- (a) The clerk of the Board will send notices of a decision forthwith to the applicant, to parties in interest and to every person present at the hearing who requests that notice be sent to him/her and states the address to which such notice is to be sent.
- (b) The clerk of the Board will send copies of the decision of the Board to the applicant, the Board of Selectmen, the Board of Assessors, the Town Clerk, the Building Inspector, and where determined appropriate by the Board, other Town boards and departments.
- (c) A special permit or site plan approval, or any extension, modification or renewal thereof, shall not take effect until a copy of the decision bearing the certification of the Town Clerk that twenty (20) days have elapsed after the decision has been filed in the office of the Town Clerk and either that no appeal has been filed or the appeal has been filed within such time, or if it is a special permit or site plan approval which has been approved by reason of the failure of the Board to act thereon within the time prescribed, a copy of the application for the special permit or site plan approval accompanied by the certification of the Town Clerk stating the fact that the Board failed to act within the time prescribed, and whether or not an appeal has been filed within that time, and that the grant of the application resulting from the failure to act has become final, is recorded in the Essex County Registry of Deeds and indexed in the grantor index under the name of the owner of record or is recorded and noted on the owner's certificate of title. The person exercising rights under a duly appealed special permit or site plan approval does so at risk that a court will reverse the permit and that any construction

performed under the permit may be ordered undone. This section shall in no event terminate or shorten the tolling, during the pendency of any appeals, of the 6 month periods provided under the second paragraph of M.G.L., Ch. 40A, Section 6.

- (d) The applicant is responsible for filing the certified decision in the Registry of Deeds and for paying the recording fees.
- (e) A certified copy of the decision and an affidavit from the Registry of Deeds stating that the decision has been recorded are necessary before a building permit dependent on the Board's decision can be issued by the Building Inspector.

#### **ARTICLE VI. POLICIES AND ADVICE**

Any advice, opinion, or information given by any Board member or any other official or employee of the Town shall not be binding on the Board. It is declared to be the policy of the Board to discourage any personal appeals or comments to members of the Board and that all communications outside a convened meeting of the Board concerning proposed or pending matters shall be submitted through the clerk.

#### **ARTICLE VII. AMENDMENTS**

These Rules may be amended by a majority vote of the members of the Board, provided that such amendment shall be presented in writing at a regular meeting and action taken thereof at a subsequent regular meeting.

#### **ARTICLE VIII. EFFECTIVE DATE**

These Rules were adopted at a regular meeting of the Board on January 14, 2016 and became effective as of January 15, 2016.

## APPENDIX I

Standard Operating Procedures

Winter Road Maintenance

<b>STANDARD OPERATING PROCEDURE</b> <b>DEPARTMENT OF PUBLIC WORKS [OR OTHER]</b>  <b>PROGRAM:</b> Snow Removal and De-Icing	<b>SOP NUMBER:</b>	<b>ISSUE DATE:</b>
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**APPROVED BY:**

\_\_\_\_\_

Bill Tyack - Public Works Director [or other]

**MA SMALL MS4 PERMIT REQUIREMENT SUMMARY:**

**Part 2.3.7.a.iii.5.**  
The permittee shall establish and implement procedures for winter road maintenance including the use and storage of salt and sand; minimize the use of sodium chloride and other salts, and evaluate opportunities for use of alternative materials; and ensure that snow disposal activities do not result in disposal of snow into waters of the United States. For purposes of this MS4 Permit, salt shall mean any chloride-containing material used to treat paved surfaces for deicing, including sodium chloride, calcium chloride, magnesium chloride, and brine solutions.

**Personnel**  
The following personnel are responsible for snow and ice removal. Employees performing the procedures in this SOP shall attend yearly stormwater pollution prevention training.

**TABLE 1**

Name	Responsibility
Keith Carter	12' Plow on Loader
Travis Good	Peterbilt 11' Plow with Wing & Sander
Patrick Nolan	International 11' Plow with Sander
Shawn Davis	1 Ton Dump with 9' Plow & Sander
William Wildes	Pickup with 8' Plow
Sean McCarthy	1 Ton Dump with 9' plow
Alex Mackey	Pickup with 8' Plow
William Tyack	Pickup with 8' Plow
Lenny Tuneburg	Utility Truck with 8' Plow

**Equipment**  
The municipality owns and maintains ice control and snow removal equipment listed in Table 2. Equipment maintenance shall be conducted consistent with the Vehicles and Equipment maintenance SOP found here: **[91 Grapevine Rd- DPW GARAGE]**. The wash bay/ area is located at: **[DPW GARAGE]**

**Plowing**  
When conditions warrant, plows are installed on the **[ 3 ]** larger trucks to move snow from the traveled roadway. Average time to install a plow is approximately **[10]** minutes. **[7]** smaller trucks are available for plowing of residential streets and clearing public lots.

<b>STANDARD OPERATING PROCEDURE</b> <b>DEPARTMENT OF PUBLIC WORKS [OR OTHER]</b>  <b>PROGRAM:</b> Snow Removal and De-Icing	<b>SOP NUMBER:</b>	<b>ISSUE DATE:</b>
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**Salt & Sand Spreaders**

When conditions warrant, salt spreaders are installed on the [3] larger trucks to spread salt on the traveled roadway. Each salt spreader is calibrated prior to the deicing season and every [2 weeks] thereafter. Salt /Sand application shall be calibrated to dispense rates of [500] pounds per lane mile [2] of trucks are equipped with brine tanks which are calibrated prior to the deicing season and every [2 weeks] thereafter.

**TABLE 2**

Equipment Number	Make	Description	Additional Equipment	Primary Use
[00001]	[XXXX]	[12-yard dump truck]	[4-yard salt spreader. 11' Side-cast plow]	[General Salting and Plowing]
601	2002 Chevrolet	7 Yard Dump		
602	International	10 Yard Dump	10' w/Wing Plow, 7 Yard Sander 75 Gal. Tanks Liquid Safe Melt.	10' w/Wing Plow, 7 Yard Sander
603	Peterbilt	10 Yard Dump	10' w/Wing Plow, 7 Yard Sander 75 Gal. Tanks Liquid Safe Melt.	10' w/Wing Plow, 7 Yard Sander
604	GMC	Pick-Up	8' Plow	
605	Chevrolet	1 Ton Dump	9' Plow	
606	Chevrolet	Pick-Up	8' Plow	
607	John Deere	Front End Loader	11' Plow	
610	Chevrolet	1 Ton Dump	2 yd. Salt Spreader 9' Plow	Sanding & Plowing
65	Chevrolet	Utility Truck	8' Plow	

Other Equipment available from other divisions:

**[Water Department, Chevrolet Utility Truck 8' Plow. Primary use is plowing.]**

**Materials**

The major materials used in snow and ice control are coarse sand, coarse salt, anti-icing agent. These materials are stockpiled in advance of an event and are immediately available when needed and stocks are replenished between events.

**Sand**

Sand is used as an abrasive for traction on slick roadways. Approximately [179.54] cubic yards are anticipated to be used per year and are ordered from **Bentley Warren Trucking** prior to each deicing season. Sand is stored in the covered facility located at: [enter location(s) of storage]. Loading areas and yards are swept [as needed] to prevent sand build-up and run-off.

<b>STANDARD OPERATING PROCEDURE</b> <b>DEPARTMENT OF PUBLIC WORKS [OR OTHER]</b>  <b>PROGRAM:</b> Snow Removal and De-Icing	<b>SOP NUMBER:</b>	<b>ISSUE DATE:</b>
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**Salt**  
Salt is used to expedite the melting of snow and ice from the street surface and also to keep the ice from forming a bond to the street surface. Approximately [985 ] tons of [*coarse salt*] are anticipated to be used per year and are ordered from [*Eastern Minerals-Boxford Salt Consortium* ] prior to each deicing season. Salt is stored in the covered facility located at: [*91 Grapevine Rd.*]. Loading areas and yards are swept [*as needed* ] to prevent salt build-up and run-off.

**Anti-icing and Pre-Wetting Chemical**  
Approximately [2500] gallons of [*Safe Melt* ] is estimated to be needed for anti-icing application. These chemicals are stored at 91 Grapevine Rd.] in [3000] gallon storage tanks equipped with appropriate spill control.

**Procedures**

Anti-Icing –N/A

<b>STANDARD OPERATING PROCEDURE</b> <b>DEPARTMENT OF PUBLIC WORKS [OR OTHER]</b>  <b>PROGRAM:</b> Snow Removal and De-Icing	<b>SOP NUMBER:</b>	<b>ISSUE DATE:</b>
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**Salt & Sand Application**

1. Whenever conditions warrant, salt is applied to the roadway prior to accumulation of snow to prevent compacted snow from bonding to the roadway surface. **[Police Dept. or DPW Director]** will instruct staff when salt application is appropriate.
2. Prior to salt application, equipment will be checked to ensure proper working order and ensure proper calibration of equipment. All fluid levels will be checked and filled to proper levels, all lights must be in working order. A visual walk-around inspection of the truck or equipment must be made. Any repairs must be made and reported to a supervisor or mechanic before leaving the yard.
3. The standard salt application speed is: **[20]** mph.
4. Follow the prioritized route or schedule. This schedule is located at: **[EAST/WEST Side of Town]**
5. Before parking any truck or equipment after use, all fluid levels will be checked and filled. All minor repairs will be done by the operator. Any repairs the operator cannot perform will be written up on the proper forms and turned in to **[Patrick Nolan]**. **[Patrick Nolan]** will determine importance and will assign the repairs according to schedule. All deicing chemical will be washed from equipment at the wash bay or designated wash area.

**Snow Plowing**

1. As the storm develops and **[3 ]** inches of snow has accumulated, all of the drivers and available equipment will begin to plow their assigned routes.
2. Prior to plowing operations, equipment will be checked to ensure proper working order. All fluid levels will be checked and filled to proper levels, all lights must be in working order. A visual walk-around inspection of the truck or equipment must be made. Any repairs must be made and reported to a supervisor or mechanic before leaving the yard.
3. Avoid plowing, pushing, blowing or storing excess snow, deicer, or other debris in or near creeks, watercourses or storm drainage systems.
4. Reduce plowing speed in sensitive areas (near creeks, wetlands or other water courses) to prevent snow and deicing materials from entering waterways.
5. The standard plowing speed is: **[15-20 ]** mph.
6. Follow the prioritized route or schedule.
7. Before parking any truck or equipment after use, all fluid levels will be checked and filled. Blades or bolts, which need replacing, will be taken care of unless told to do otherwise. Chains that need repairs will be repaired. All minor repairs will be done by the operator. Any repairs the operator cannot perform will be written up on the proper forms and turned in to **[Patrick Nolan]**. **[Patrick Nolan]** will determine importance and will assign the repairs according to schedule.

<b>STANDARD OPERATING PROCEDURE</b> <b>DEPARTMENT OF PUBLIC WORKS [OR OTHER]</b>  <b>PROGRAM:</b> Snow Removal and De-Icing	<b>SOP NUMBER:</b>	<b>ISSUE DATE:</b>
<b>Record Keeping and Documentation</b> <ol style="list-style-type: none"> <li>1. Maintain a master schedule of prioritized snow and sanding routes and the miles or roads plowed or sanded. <b>[DPW Director's Office-91 Grapevine Rd.]</b></li> <li>2. Keep copies of manufacturer's recommendations for equipment calibration, plowing speed and salt/sand application rates. <b>[DPW Director's Office-91 Grapevine Rd.]</b></li> <li>3. Keep records of the amounts of salt, sand, liquid deicer, and salt alternatives applied per season. <b>[Town Hall – DPW Office, 138 Main Street, Wenham, MA]</b></li> <li>4. Keep a list of all employees trained in the facility's Stormwater Pollution Prevention binder or computer file.</li> </ol>		

## APPENDIX J

2016 MS4 Annual Reports

**Year 1 Annual Report**  
**Massachusetts Small MS4 General Permit**  
**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:

EPA NPDES Permit Number:

**Primary MS4 Program Manager Contact Information**

Name:

Title:

Street Address Line 1:

Street Address Line 2:

City:

State:

Zip Code:

Email:

Phone Number:

Fax Number:

**Stormwater Management Program (SWMP) Information**

SWMP Location (web address):

Date SWMP was Last Updated:

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

*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 1 Requirements

- Develop and begin public education and outreach program
- Identify and develop 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:  

N/A - No sewers in the Town of Wenham
- Develop written IDDE plan including a procedure for screening and sampling outfalls
- IDDE ordinance complete
- Identify each outfall and interconnection discharging from MS4, classify into the relevant category, and priority rank 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:
- Construction/ Erosion and Sediment Control (ESC) ordinance complete
- Develop written procedures for site inspections and enforcement of sediment and erosion control measures
- Develop written procedures for site plan review
- Keep a log of catch basins cleaned or inspected
- Complete inspection of all stormwater treatment structures

### 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
- Annual training to employees involved in IDDE program
- All curbed roadways have been swept a minimum of one time per year

**Bacteria/ Pathogens** (Combination of Impaired Waters Requirements and TMDL Requirements as Applicable)

Annual Requirements

*Public Education and Outreach\**

- Annual message encouraging the proper management of pet waste, including noting any existing ordinances where appropriate
- Permittee or its agents disseminate educational material to dog owners at the time of issuance or renewal of dog license, or other appropriate time
- Provide information to owners of septic systems about proper maintenance in any catchment that discharges to a water body impaired for bacteria

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

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 of Wenham does not have any sewers, therefore SSO's are not applicable to this report.

The Town has a detailed template that they are modifying to meet their needs for site inspections, enforcement of sediment and erosion control measures and site plan reviews.

### 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:

Changes have been made to the list of receiving waters and outfalls as additional data has been collected regarding outfall ownership, outfall discharge location, and drainage system configuration as part of a comprehensive drainage mapping effort. No new applicable impairments or TMDLs have been identified as part of this effort. The list of outfalls, receiving waters, and impairments included in the Town's Stormwater Management Plan reflects these changes.

## 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 the reporting period:

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:Brochures/Pamphlets**

Message Description and Distribution Method:

The Brochure consisted of a 'how-to-guide' for residents on how rain gardens work and how to install them in their home.

Targeted Audience:

Responsible Department/Parties:

Measurable Goal(s):

Tracked the number of brochures/pamphlets and any provided resident testimonials. 500 brochures were delivered by Greenscapes North Shore Coalition.

Message Date(s):

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:Workshop/Info Sheet**

Message Description and Distribution Method:

The workshop and associated literature covered LID options for reducing runoff and promoting on-site infiltration. Pricing, maintenance and ordinances was also be discussed.

Targeted Audience:

Responsible Department/Parties:

Measurable Goal(s):

Tracked the number of attendees at the workshop and any increase on LID use. There were 35 attendees at the workshop including the Wenham Planning Coordinator.

Message Date(s): January 17, 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:

Greenscapes North Shore Coalition determined developers themselves were a very challenging audience to target. They found that approaching the Town Engineers, Planning Boards and Conservation commissions was a more realistic goal and planned to pass the information on to developers in that way.

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 Department of Public Works (DPW) made the Stormwater Management Plan (SWMP) available to the public on their website and upon request.

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:

Wenham participates in Hazardous Waste Drop Off day with the Town of Hamilton, where residents can drop off waste. This year there was a total of 15 full car loads and 33 half car loads that participated in the event. Some of the items collected were consolidated solvents, mixed aerosols, pesticide liquids in consumer packaging, and pesticide solids in consumer packaging.

Wenham DPW maintains their stormwater hotline and continues to inform residents of the proper town offices to contact if they need information or to report problems dealing with stormwater issues.

## 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: N/A

Number of SSOs removed: N/A

*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:

Total number of SSOs removed:

### **MS4 System Mapping**

Describe the status of your MS4 map, including any progress made during the reporting period (phase I map due in year 2):

The Town has been working to develop a comprehensive map of the drainage system, including outfalls, pipes, manholes, catch basins, municipally owned stormwater treatment structures, and impaired water bodies. Catchment areas have been delineated. Drainage infrastructure has been designated in the Town's GIS. The drainage map will be continuously updated as investigations are performed during the permit term. The Town will be working to map the remainder of their open channel conveyances, and any interconnections during Permit Year 2. All existing mapping is accordance with the 2016 MS4 Permit's accuracy guidelines.

### **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:

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

Number of outfalls screened:

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

Percent of total 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:

*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:

*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:

*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:

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 conducted during the reporting period:

Employee training was conducted on June 18, 2019. The Town of Wenham plans to train their DPW employees annually. There were 3 attendees from Wenham.

*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 Town is aware of this requirement but has not started the process.

### **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:

The Town is aware of this requirement but has not started the process.

### **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:

The Town is aware of this requirement but has not started the process.

### **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:

The Town is aware of this requirement but has not started the process.

**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:

The Town is aware of this requirement but has not started the process.

**MCM6: Good Housekeeping**

**Catch Basin Cleaning**

Describe the status of the catch basin cleaning optimization plan:

Please see additional comments section.

*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: 581

Number of catch basins cleaned: 581

Total volume or mass of material removed from all catch basins: 680 CY

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

Total number of catch basins: 581

*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 Town will check measurements in year 2 to determine if additional cleanings are needed.

**Street Sweeping**

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

All streets are swept at a minimum of once per year.

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

Number of miles cleaned: 36

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:

The Town sweeps all paved roadways, curbed or uncurbed, once per year.

**Winter Road Maintenance**

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

The Town of Wenham has developed Standard Operating Procedures for winter road maintenance. This is attached in Appendix I of their SWMP.

**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 Town is aware of this requirement but has not started the process.

**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 Town is aware of this requirement but has not started the process.

**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 is aware of this requirement but has not started the process.

*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 is aware of this requirement but has not started the process.

**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:

N/A

### **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 DPW obtained invert to sump measurements of each catch basin to begin the process of determining if the catch basins are 50% full in the future.

### **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

- Complete system mapping Phase I
- Begin investigations of catchments associated with Problem Outfalls
- Develop or modify an ordinance or other regulatory mechanism for post-construction stormwater runoff from new development and redevelopment
- Establish and implement written procedures to require the submission of as-built drawings no later than two years after the completion of construction projects
- Develop, if not already developed, written operations and maintenance procedures
- Develop an inventory of all permittee owned facilities in the categories of parks and open space, buildings and facilities, and vehicles and equipment; review annually and update as necessary
- Establish a written program detailing the activities and procedures the permittee will implement so that the MS4 infrastructure is maintained in a timely manner
- Develop and implement a written SWPPP for 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
- Develop, if not already developed, written procedures for sweeping streets and municipal-owned lots
- Develop, if not already developed, written procedures for winter road maintenance including storage of salt and sand
- Develop, if not already developed, a schedule for catch basin cleaning
- Develop, if not already developed, a written procedure for stormwater treatment structure maintenance
- Develop a written catchment investigation procedure (*18 months*)

### **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
- Annual training to employees involved in IDDE program
- Update inventory of all known locations where SSOs have discharged to the MS4 in the last 5 years
- Continue public education and outreach program
- Update outfall and interconnection inventory and priority ranking and include data collected in connection with the dry weather screening and other relevant inspections conducted
- Implement IDDE program
- Review site plans of construction sites as part of the construction stormwater runoff control program
- Conduct site inspection of construction sites as necessary
- Inspect and maintain stormwater treatment structures
- Log catch basins cleaned or inspected
- Sweep all uncurbed streets at least annually

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

The Town has the following activities planned for year 2 of the permit:

BMP: Provide pamphlets/brochures to provide information on LID options for reducing runoff and promoting on-site infiltration.

BMP: Update GIS Drainage Map as needed

BMP: Implement IDDE Program including starting the dry-weather outfall sampling.

BMP: As-built plans for on-site stormwater control - review existing regulations to ensure as-built plan submittal requirements are included.

BMP: Review regulations to ensure the requirements of the MA Stormwater Handbook are met.

BMP: O&M Procedures for municipal activities and facilities that could effect MS4.

BMP: Inventory all Permittee-Owned Property

BMP: Create O&M for stormwater infrastructure

BMP: Develop Stormwater Pollution Prevention Plan (SWPPP) for required municipal facilities

BMP: Develop Catch Basin Cleaning Optimization Program

## Part V: Certification of Small MS4 Annual Report 2019

### 40 CFR 144.32(d) Certification

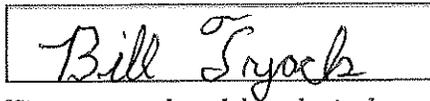
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage 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:

Bill Tyack

Title: DPW Director

Signature:



Date:

9/19/19

*[Signatory may be a duly authorized representative]*

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

### Annual Report Submission

Please submit the form electronically via email to both EPA and MassDEP by clicking on one of the links below or using the email addresses listed below. Please ensure that all required attachments are included in the email and not attached to this PDF.

EPA:

MassDEP:

### Paper Signature:

If you did not sign electronically above, you can print the signature page by clicking the button below.

[Print Signature Page](#)

Optional: If you did not sign electronically above, you may lock the form by clicking the "Lock Form" button below which will prompt you to save the locked version of the form. Save this locked version under a new file name.

[Lock Form](#)

## APPENDIX K

### Authorization Letter



July 9, 2019

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 Bill Tyack, DPW Director 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 Wenham. 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."

[SIGNATORY per Part B.11 of Appendix B]

  
\_\_\_\_\_  
[John Petrin]

7/9/19  
\_\_\_\_\_  
[Date]

\_\_\_\_\_  
[Interim Town Administrator]

## APPENDIX L

### Operation and Maintenance Plan



Weston & Sampson<sup>SM</sup>

[westonandsampson.com](http://westonandsampson.com)

55 Walkers Brook Drive, Suite 100  
Reading, MA 01867  
tel: 978.532.1900

# OPERATIONS & MAINTENANCE PLAN

MS4 GENERAL PERMIT COMPLIANCE

SEPTEMBER 2020



TOWN OF  
**Wenham**  
MASSACHUSETTS

# O&m

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## 1.0 INTRODUCTION

### 1.1 Requirement for Standard Operating Procedures

The 2016 Massachusetts MS4 General Permit, which came into effect on July 1, 2018, regulates discharges from small municipal separate storm sewer systems (MS4s) to waters of the United States. The Permit requires MS4 operators to develop, implement, and enforce a stormwater management program (SWMP). The purpose of the SWMP is to reduce the discharge of pollutants from the MS4 to the maximum extent practicable, to protect water quality, and to satisfy the applicable water quality requirements of the Clean Water Act. MS4 operators implement various Best Management Practices (BMPs) for each of six minimum control measures. These minimum control measures are as follows:

- Public Education and Outreach
- Public Involvement/Participation
- Illicit Discharge Detection and Elimination
- Construction Site Stormwater Runoff Control
- Post-Construction Stormwater Management in New Development and Redevelopment
- Good Housekeeping and Pollution Prevention for Municipal Operations

As part of the minimum control measure for Good Housekeeping and Pollution Prevention for Municipal Operations, Section 2.3.7 of the 2016 MS4 Permit requires regulated communities to develop and implement a written Operations and Maintenance (O&M) program for municipal activities and facilities. The O&M program serves to prevent or reduce pollutant runoff and protect water quality, and is required to include the following components:

1. Written O&M procedures for the following activities/facilities:
  - a. Parks and open space
  - b. Buildings and facilities where pollutants are exposed to stormwater runoff
  - c. Vehicles and equipment
2. An inventory of all permittee-owned facilities
3. A written program outlining the necessary actions the permittee will implement so that the MS4 is properly maintained to reduce the discharge of pollutants from the MS4, including:
  - a. Optimization of routine inspections, cleaning and maintenance of catch basins
  - b. Implementation of procedures for sweeping and/or cleaning streets and municipally owned parking lots
  - c. Proper storage and disposal of catch basin cleanings and street sweepings
  - d. Implementation of procedures for winter road maintenance
  - e. Implementation of inspection and maintenance frequencies and procedures for storm drain systems and stormwater treatment structures
4. Written records for all maintenance activities, inspections and training.

To address these requirements, Standard Operating Procedures (SOPs) associated with these municipal activities and facilities were taken and/or adapted from templates developed by EPA and the Central Massachusetts Regional Stormwater Coalition (CMRSWC). These templates were developed for use by MS4 communities in complying with the permit requirements outlined above. These pre-developed SOPs can be implemented by the town or adjusted to fit current practices as long as these practices meet all MS4 requirements.

### 1.2 Applicability

The operation and maintenance procedures outlined in this document and the accompanying SOPs apply to all the facilities, vehicles, and equipment denoted in the inventory included in Appendix A, as well as any activities associated with each facility, vehicle, or piece of equipment. They shall also apply to all drainage infrastructure owned or operated by the Town. The inventory will be updated annually to reflect any changes in property or equipment ownership.

## 2.0 PARKS AND OPEN SPACE

### 2.1 Overview

The Town of Wenham performs regular maintenance on parks and open spaces to ensure aesthetic appeal throughout the town. Maintenance consists of mowing, weeding, planting, reseeding, pruning, leaf removal, and solid waste management. The Town of Wenham does not fertilize their fields and parks. Stormwater pollutants that can be generated from these activities include nutrients, pesticides, organics, sediment, trash, and bacteria.

The Town of Wenham owns and maintains the following parks and open spaces:

- Pingree Park
- West Wenham Playground
- Pleasant Pond Beach
- Rail Trail (Topsfield Road)

This list can be seen as well as the location for each park and open space in Appendix A.

### 2.2 Operation and Maintenance Activities

The Town of Wenham performs most of the maintenance in house at all the locations listed above. All lawns are cut, weeded, irrigated, and seeded/reseeded by The Town. The Town is also responsible for the following:

- Trimming/pruning trees and shrubs,
- Maintaining mulch in shrub beds
- Removing leaves every fall

The Town has a contract with Casella Waste Systems and they bring all resident and municipal waste to Wheelabrator. Leaf litter and other organic materials are disposed of on Brick – Ends Farm, 464 Highland Street, South Hamilton, MA. There is one station for disposal for dog waste at Pingree Park for proper disposal. Waste from other locations is disposed of in trash barrels.

Appendix B Provides Standard Operating Procedures that the Town should follow for all operation and maintenance activities in its parks and open spaces, including

- B.1 Parks and Open Space Management

## 3.0 MUNICIPAL BUILDINGS AND FACILITIES

### 3.1 Overview

Wenham owns and operates a variety of different buildings that have the potential for pollutants to be exposed to stormwater runoff. A complete list and the locations can be seen in Appendix A. Below is the list of Municipal buildings owned and operated by the Town of Wenham:

- Barn – Iron Rail Property
- Cemetery Garage
- Department of Public Works Sign Shop
- Lord Hill/Gymnasium
- Pingree Park Restroom and Garage
- Fire Station
- Salt Shed
- Department of Public Works Garage
- Water Tank and Pump Station
- Department of Public Works Storage Shed
- Police Station
- Iron Rail Parking Garage
- Town Hall
- Hamilton Wenham Joint Library
- Main Street Shed
- School Street Senior Center

### 3.2 Use, Storage, and Disposal of Petroleum Products and Other Stormwater Pollutants

The Town has restrictions in place regarding the use, storage, and disposal of petroleum products and other stormwater pollutants to prevent the potential for polluted stormwater. Red, leak-proof gas cans are used to handle and use of flammable liquids such as gasoline. Resident waste oil and used antifreeze are disposed of during the annual hazardous waste drop off every October.

All oil stored at the highway department is in a 275-gallon tank contained in a storage container or burned in their waste oil burner. Any spilled oil in this facility is collected by a floor drain and brought to a tight tank, which is then pumped down on an as needed basis.

There is a fuel island located at the Highway Department, both the Diesel and Gasoline tanks are underground, and checked monthly for leaks. There are no other fueling stations at any other facility.

Appendix C provides Standard Operating Procedures that the Town should follow for the use, storage, and disposal of petroleum or other hazardous products utilized at municipal facilities, including:

- C.1: Fuel and Oil Handling
- C.2: Hazardous Materials Storage and Handling

### 3.3 Employee Training

The Town has developed an employee training program, which provides information regarding stormwater pollution prevention and good housekeeping practices for municipal operations. Management practices included as part of the training program consist of: (1) minimizing and preventing exposure of vehicles and equipment to stormwater, (2) good housekeeping operations, (3) preventative maintenance, (4) spill prevention and response, (5) erosion and sediment control, (6) stormwater runoff management, (7) management of salt and piles containing salt and (8) maintenance of control measures. Training on the proper use, storage, and disposal of petroleum products is also included.

The Town has a Stormwater Pollution Prevention Plans (SWPPPs) in place for the Highway Department since the end of Permit Year 2 (June 30, 2020). Employees at both facilities will complete annual training on the management practices outlined in the SWPPP.

### 3.4 Spill Prevention and Response

The Highway Department Garage has a spill prevention and Response Plan. A copy of the plan is kept in the Town Offices, and employees are trained on its contents once annually. The facility has a spill kit at the fueling station, and in the garage bay. These spill kits are stored near areas where oil and other chemicals are stored, and where there is vehicle and equipment storage/maintenance. The plan includes written procedures for the proper disposal of used absorbent/spill containment material.

In addition to the Spill Prevention and Response plan, other Good Housekeeping measures are in place to minimize the risk of spilled pollutants entering nearby surface waters. All transfers to and from fuel oil and chemical tanks on site are observed by qualified personnel trained in spill response procedures. Hydraulic equipment is kept in good repair to prevent leaks. Equipment and vehicles are regularly inspected to avoid situations that may result in leaks, spills, and other releases of pollutants that could be conveyed with stormwater to receiving waters. The fueling area at the Highway Department is also regularly inspected for

.....

signs of spills or leaks, which includes inspection of hoses and fittings. Any spills are cleaned up immediately or are properly marked by barricades. Grease and oil spills are treated with an absorbent compound.

Appendix C provides additional Standard Operating Procedures that the Town should follow for spill response at all facilities, including:

- C.3: Spill Response and Cleanup

### 3.5 Waste Management and Other Applicable Good Housekeeping Practices

The Town of Wenham contracts Casella Waste Systems to pick up and dispose of all municipal waste.

Building maintenance is conducted to minimize the potential for stormwater pollution. This includes practices such as using tarps and drop cloths when painting or sanding, routinely checking buildings for leaks, and sweeping facility parking lots and driveways.

Appendix C also provides Standard Operating Procedures pertaining to waste management and facility housekeeping, including:

- C.4: Operations and Maintenance of Municipal Buildings and Facilities

There are other Standard Operating Procedures that are applicable to municipal buildings and facilities but are discussed and referenced exclusively in other sections. These include the following:

- SOPs for lawn maintenance and landscaping activities, which are included under Section 2.0, Parks and Open Space
- SOPs for vehicle and equipment storage, washing, and fueling, which are discussed in Section 4.0, Municipal Vehicles and Equipment
- SOPs for street sweeping, snow disposal, and the storage and application of deicing materials, which are discussed exclusively under Section 5.0, Infrastructure Operations and Maintenance.

## 4.0 MUNICIPAL VEHICLES AND EQUIPMENT

### 4.1 Overview

The Highway Department is responsible for all the vehicles used by themselves. An inventory of all vehicles operated and maintained by the Highway Department is included in Appendix A.

### 4.2 Municipal Vehicle Storage, Maintenance, and Repair

Vehicle maintenance facilities have the potential for spills that could contaminate stormwater. Potential pollutants associated with municipal vehicle storage, maintenance, and repair activities include oil and grease, petroleum products, metals, organics and chlorides.

In Wenham, vehicle maintenance is performed within the Highway Department garage. This maintenance includes all changing of fluids. Employees use spigots/funnels to minimize drips/leaks, use drip pans when changing fluids, and have absorbing compounds available for use in the event of a spill. The maintenance garage is equipped with floor drains, which discharge to a tight tank. Spill prevention practices are still encouraged to reduce the amount of oil entering tight tank.

.....

At the Highway Department garage and transfer station all vehicles are stored inside to the most practicable extent.

#### 4.3 Municipal Vehicle and Equipment Fueling

All Highway Department Vehicles are fueled on site at the Town's fuel Island. Fuel is supplied by two separate diesel and gasoline tanks both buried underground. The gasoline and diesel tank are 10,000 gallons, each. The tanks are assessed monthly for leaks. The island is covered with no secondary containment. Potential stormwater pollutants associated with municipal vehicle and equipment fueling include oil and grease, petroleum products, trash, metals and organics. The fueling area is inspected regularly for signs of spills or leaks, and there is a concrete pad below the fueling station. Spill response procedures are in place

#### 4.4 Municipal Vehicle Washing

Potential stormwater pollutants associated with municipal vehicle washing include sediment, nutrients, chlorides, trash, metals, oil & grease, petroleum products and organics. All employees know that no outdoor vehicle washing can occur.

All vehicle washing is conducted in the Highway Department building. There is one portion of the vehicle storage area of the Highway Department garage designated for vehicle washing. Vehicle wash water is collected by the building's floor drains and discharged to tight tank.

#### 4.5 Other Applicable Good House Keeping/ Pollution Prevention Practices

Appendix D provides Standard Operating Procedures related to vehicle and equipment operation and maintenance, including:

- D.1: Operations and Maintenance of Municipal Vehicles and Equipment

There are other Standard Operating Procedures that are applicable to Municipal Vehicles and Equipment but are discussed and referenced exclusively in other sections. These include the following:

- SOPs for the use, storage, and disposal of petroleum products; SOPs for spill prevention and response, and SOPs for waste management, which are included under Section 3.0, Municipal Buildings and Facilities
- SOPs for street sweeping, which are discussed exclusively under Section 5.0, Infrastructure Operations and Maintenance

## 5.0 INFRASTRUCTURE OPERATIONS AND MAINTENANCE

### 5.1 Drainage System Overview

Wenham has developed a comprehensive map of the Town's drainage system in GIS, which includes town-wide mapping of outfalls, culverts, drain manholes, catch basins, drainage pipes, swales, etc. The system consists of approximately:

- 11 miles of drainage pipe
- 581 municipal catch basins,
- 113 municipal storm drain manholes,

.....

- 247 municipal outfalls

Wenham has several outfalls that discharge directly to surface waters, and few that discharge to infiltration or leaching basins which infiltrate stormwater directly into the ground.

## 5.2 Catch Basin Cleaning

The Town of Wenham contracts out routine inspections, cleaning, and maintenance of their 581 catch basins that are located within the MS4 regulated area. The Town of Wenham will implement the following catch basin inspection and cleaning procedures to reduce the discharge of pollutants from the MS4. Over the past two years the Town of Wenham has been cleaning, inspecting, and measuring depths of sediment, bottom of inlet, and height of sump. This data will be utilized to identify those catch basins that are filling up more quickly and will therefore need to be cleaned more than once annually to ensure that the “50 Percent” goal is always reached. A catch basin inspection/cleaning procedure, inspection form, and log of catch basins cleaned or inspected are included in Appendix E. All catch basin cleanings are brought to the Highway Department Facility on 91 Grapevine Road, Wenham, Massachusetts.

To meet anticipated requirements of the new MS4 Permit, the Town will need to optimize catch basin inspection, cleaning and maintenance such that the following conditions are met:

- If a catch basin sump is more than 50 percent full during two consecutive routine inspections or cleaning events, the finding will be documented, the contributing drainage area will be investigated for sources of excessive sediment loading, and to the extent practicable, contributing sources will be addressed. If no contributing sources are found, the inspection and cleaning frequency will be increased.
- Catch basins located near construction activities (roadway construction, residential, commercial, or industrial development or redevelopment) will be inspected and cleaned more frequently if inspection and maintenance activities indicate excessive sediment or debris loadings (i.e., catch basins more than 50 percent full). Priority will also be given to catch basins that discharge to impaired waters.
- The following information will be included in each annual report:
  - Any action taken in response to excessive sediment or debris loadings
  - Total number of catch basins
  - Number of catch basins inspected
  - Number of catch basins cleaned
  - Total volume or mass of material removed from catch basins.

Appendix E provides Standard Operating Procedures that the Town should follow, including:

- E.1: Catch Basin Inspection and Cleaning

## 5.3 Street Sweeping

The town of Wenham has 36 centerline miles of paved, public roads within the town. All streets and parking lots under municipal jurisdiction are swept a minimum of once per year.

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The Town of Wenham will implement the following street and parking lot sweeping procedures to reduce the discharge of pollutants from the MS4:

- All streets with the exception high speed limited access highways will be swept and/or cleaned a minimum of once per year in the spring (following winter activities such as sanding).
- More frequent sweeping will be considered 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.

The following information will be included in each annual report:

- Number of miles cleaned, or the volume or mass of material removed (see sweeping log in Appendix F).

All street sweepings are brought to the Highway Department, where they are stockpiled to dry and then hauled away.

#### 5.4 Inspection and Maintenance of Stormwater Treatment Structures

The Town uses in-house personnel to conduct annual inspections of its existing stormwater treatment structures, which include three stormceptors. When properly maintained, these structures reduce stormwater pollution and reduce stormwater facility maintenance costs. A complete inventory of existing stormwater treatment structures is included in Appendix A.

Appendix G provides Standard Operating Procedures for stormwater treatment structures, including:

- G.1: Inspection and Maintenance of Structural Stormwater Best Management Practices (BMPs)

Many stormwater treatment structures are proprietary systems for which the manufacturer provides operation and maintenance procedures. In the event that there are conflicting operation and maintenance procedures for a stormwater treatment structure, any procedure provided by the manufacturer shall take precedent.

#### 5.5 Winter Road Maintenance

Potential stormwater pollutants associated with winter road maintenance include chloride, sediment and various deicing materials. Pollution potential is reduced by properly storing salt and sand, minimizing the use of sodium chloride and other salts, evaluating opportunities for use of alternative materials, and ensuring that snow disposal activities do not result in disposal of snow into waters of the United States.

The Town of Wenham uses salt and sand during winter road operations. All salt is stored in a 3,600 square foot salt shed. This is where all truck loading and unloading occurs also. If any salt is spilt outside of the shed, it is quickly swept up and moved back inside. Sand is stored in a stockpile next to the salt storage shed and is contained on three sides. All sand and salt mixing is done inside the salt shed.

Appendix H provides Standard Operating Procedures for winter road maintenance, including:

- H.1: Salt Use Optimization/ Winter Road Maintenance

.....

There are other Standard Operating Procedures that are applicable to Winter Road Maintenance but are discussed and referenced exclusively in other sections. These include the following:

- SOPs for the operation and maintenance of vehicles and equipment, which are discussed exclusively under Section 4.0, Municipal Vehicles and Equipment

APPENDIX A

Parks and Open Space Inventory

Municipal Buildings and Facilities Inventory

Municipal Vehicles and Equipment Inventory

Inventory of Town-Owned Stormwater Treatment Structures

**Wenham, MA**  
**Parks and Open Spaces Inventory**

1	Pingree Park - Main Street, Wenham
2	West Wenham Playground - Topsfield Road
3	Pleasant Pond Beach - Pleasant Street
4	Rail Trail - Topsfield Road

**Wenham, MA****Municipal Buildings and Facilities Inventory**

1	Barn Iron Rail Property Personal Property in Above
2	Cemetery Garage 70 Main Street
3	DPW Sign Shop Iron Rail Property
4	Lord Hill/Water Tank Lord Hill/Water Tank
5	Main Building/Gymnasium 91 Grapevine Road
6	Pingree Park Restroom & Garage Recreation Building
7	Fire Station 140 Main Street
8	Pumping Station Pleasant Street
9	Salt Shed Rear 91 Grapevine
10	DPW Garage 91 Grapevine
11	Water Tank & Pump Station 91 Grapevine Road
12	DPW Storage Shed 19 Grapevine Road
13	Police Station 1 Friend Court
14	Garage Behind Iron Rail Gravel Parking Lot
15	Shed 138 Main Street
16	Town Hall 138 Main Street
17	Hamilton Wenham Joint Library 14 Union Street, Hamilton
18	Senior Center School Street

Wenham DPW Vehicle Inventory  
last revised november 2019

Make	Model	Model Year	Month/Year Purchased	Drive System: 2WD, 4 WD, or AWD	> 8500 pounds? (Y or N or NA)	Exempt or Non-Exempt? E or NE	COMBINED MPG Rating	Vehicle Description / Purpose	Is this a new acquisition?	If new acquisition, what vehicle did it replace?	Removed from inventory?
Chevy	3500HD Pickup	2014	July, 2014	4WD	Y	E	16 MPG	Highway 609	NO		
Chevy	Med. Dump	2002			Y	E		Highway 601	NO		
International	700SBA	2011			Y	E		Highway 602	NO		
Peterbilt	348 Dump	2017	November, 2016		Y	E		Highway 603	NO		
Chevy	2500HD Pickup	2015		4WD	Y	E		Highway 606	NO		
Chevy	3500HD Dump	2015		4WD	Y	E		Highway 605	NO		
GMC	3500HD Picku	2010		4WD	Y	E		Highway 604	NO		
John Deere	Backhoe	2009		4WD	Y	E		Highway 607	NO		
Jacobsen	Mower	1987			NA	E		Highway 608	NO		
Chevy	3500HD Dump	2009		4WD	Y	E		Highway 610	NO		
John Deere	Loader	2018	Jul-18	4WD	Y	E		Highway 613	NO		
Leaf Vaccum	Leaf Vacuum	2016	Jul-16		NA	E		Highway 617	NO		
Bobcat	Bobcat	1998		4WD	NA	E		Highway 631	NO		
Trackless	Trackless	2011		4WD	NA	E		Highway 635	NO		
Chevy	3500HD Utility	2009		4WD	Y	E		WATER 650	NO		
Chevy	Colorado Pickup	2016		4WD	N	NE	22 MPG	WATER 651	NO		
Takeuchi - Excavator		2016	July, 2014					mini excavator	NO		

**Town of Wenham, MA**  
**Inventory of Municipally Owned/Operated Stormwater Treatment Structures**

BMP ID or Description	Location	BMP Type	Inspection Frequency	Date of Last Inspection	Additional Notes
N/A	SETTLERS LANE	Stormceptor	Annually		
N/A	SETTLERS LANE	Stormceptor	Annually		
N/A	SETTLERS LANE	Stormceptor	Annually		

## APPENDIX B

### Standard Operating Procedure – Parks and Open Space

#### B.1: Parks and Open Space Management

# Standard Operating Procedures

Wenham, MA  
Highway Department

## Parks and Open Space Management

Issue Date:

Approved by:

Bill Tyack  
Public Works Director (or similar)

### MA Small MS4 General Permit Requirement Summary:

Part 2.3.7.a.i.

Within two (2) years from the effective date of the permit, the permittee shall develop, if not already developed, written (hardcopy or electronic) operations and maintenance procedures for all Parks and open spaces. These written procedures shall be included as part of the SWMP.

**Part 2.3.7.a.ii.1.**

Establish procedures to address the proper use, storage, and disposal of pesticides, herbicides, and fertilizers including minimizing the use of these products and using only in accordance manufacturer’s instruction. Evaluate lawn maintenance and landscaping activities to ensure practices are protective of water quality. Protective practices include reduced mowing frequencies, proper disposal of lawn clippings, and use of alternative landscaping materials (e.g., drought resistant planting). Establish pet waste handling collection and disposal locations at all parks and open space where pets are permitted, including the placing of proper signage concerning the proper collection and disposal of pet waste. Establish procedures to address waterfowl congregation areas where appropriate to reduce waterfowl droppings from entering the MS4. Establish procedures for management of trash containers at parks and open space (scheduled cleanings; sufficient number). Establish procedures to address erosion or poor vegetative cover when the permittee becomes aware of it; especially if the erosion is within 50 feet of a surface water.

### Municipal Parks and Open Space Inventory

The following is a list of properties covered by these procedures. This inventory shall be updated annually during SWMP review.

Park	Address/Location	Lawn Mowing	Landscaping	Fertilizing	Pesticide/Herbicide	Trash mgmt.	Pet waste mgmt.	Waterfowl mgmt.	Other maintenance:
Pingree Park	Main Street, Wenham	X		X		X	X		
West Wenham Playground	Topsfield Rd.	X	X			X			
Pleasant Pond Beach	Pleasant St.	X	X			X		X	
Rail Trail	Topsfield Rd.					X			



## Standard Operating Procedures

Wenham, MA  
Highway Department

Issue Date:

## Parks and Open Space Management

### Lawn Mowing

On the following schedule: once a week, during midsummer. Late summer, every other week.

Responsible Personnel: Highway Foreman

#### Standard Operating Procedures:

- Lawns shall be mowed to a height of 3".
- Mowing pattern shall vary to prevent ruts and promote even growth.
- Grass clippings shall be **mulched** using a mulching mower OR disposed of a           N/A            
(location) so as to avoid entering the storm drain system.

### Pesticide, Herbicide, and Fertilizer Use

On the following schedule: **N/A**

Except during drought conditions or preceding heavy rainfall.

Responsible Personnel: (Name of Contracted Company)

The following chemicals are utilized for municipal parks and open space management:

Chemical	Use	Storage Location*	Disposal (per manufacturer's instructions)

All fertilizer is applied stored and ordered by a private vendor through the Parks/Recreation Department.

#### Standard Operating Procedures:

- Integrated Pest Management strategies shall include           N/A           to reduce chemical use.

## Standard Operating Procedures

Wenham, MA  
Highway Department

Issue Date:

## Parks and Open Space Management

- Pesticides, Herbicides, and Fertilizers shall be applied following manufacturer's instructions as well as additional municipal instructions: **N/A**

## Other Landscaping

Involves the following:

- **Weeding**
- **Planting/reseeding**
- **Pruning**
- **Leaf litter removal**

Other Landscaping practices occur when necessary to keep the landscape in a healthy condition.

Responsible Personnel: **Park Foreman**

### Standard Operating Procedures:

- Landscaping waste shall be disposed of at **Brick - Ends Farm, 464 Highland St. South Hamilton, MA** for composting so as to avoid entering the storm drain system.
- Weeding shall be done manually where possible to reduce herbicide use.
- Leaf litter shall be disposed of at **Brick - Ends Farm, 464 Highland St. South Hamilton, MA** for composting so as to avoid entering the storm drain system.

## Trash Management

Trash cans and/or dumpsters are located at the following parks:

**Pingree Park, West Wenham, Pleasant Pond, and Rail Trail.**

Emptying and replacing bags/inspecting for leaks shall take place on the following schedule: Once per week

Responsible Personnel: **Park Foreman**

Additional trash cans or other necessary equipment shall be ordered by Foreman based on the results of park inspections.

## Standard Operating Procedures

Wenham, MA  
Highway Department

Issue Date:

## Parks and Open Space Management

Parks shall be inspected and cleaned for litter on the following schedule: Once per week

Responsible personnel: **Park Foreman**

Pet waste receptacles and/or bags are located at the following parks: **Pingree Park**

Additional pet waste receptacles, signage, bags, etc. shall be ordered by DPW Director based on the results of park inspections.

## Other Park Management

Procedures for addressing waterfowl congregation and waste at specific parks:

Choose and explain one or several options: (signage related to feeding geese) (decoys) (tall grasses near waterbodies or other structural changes) (dogs) (audio repellent) (other)

Specific Parks: **Pleasant Pond**

Responsible personnel: **Board of Health**

Procedures for addressing the emptying and cleaning of water features:

- Allow n/a hours for dechlorination
- Store disinfection chemicals indoors in secondary containment
- Train staff on spill response procedures at least annually

*(add as appropriate)*

Specific Parks: **Pleasant Pond**

Responsible personnel: **Park Foreman**

Procedures for washing or cleaning park impervious surfaces:

- Sweep impervious surface twice a year, or as necessary.
- Direction of wash water to pervious surfaces, sanitary sewer

**Standard Operating Procedures**

*Wenham, MA*  
*Highway Department*

**Issue Date:**

**Parks and Open Space Management**

Specific Parks: **Pleasant Pond Beach, Rail Trail**

Responsible personnel: **Park Foreman**

Procedures for correcting areas experiencing erosion:

- Temporary stabilization measures
- Sediment and erosion control measures
- Re-establish grass or native plants

## APPENDIX C

### Standard Operating Procedures – Municipal Buildings and Facilities

C.1 Fuel and Oil Handling

C.2 Hazardous Materials Storage and Handling

C.3 Spill Response

C.4 Operation and Maintenance of Buildings and Facilities

## C.1: Fuel and Oil Handling

### Introduction

Spills, leaks, and overfilling can occur during handling of fuels and petroleum-based materials, representing a potential source of stormwater pollution, even in small volumes. The goal of this written Standard Operating Procedure (SOP) is to provide guidance to municipal employees on a variety of ways by which fuels and petroleum-based materials can be delivered, as well as steps to be taken when petroleum products (such as waste oil) are loaded onto vehicles for offsite disposal or recycling. Delivery, unloading, and loading of waste oils are hereafter referred to as “handling.” Attached is a fuel delivery form checklist.

The Town of Wenham undertakes various procedures and precautions in handling fuel and oil, as described in Section 3.0 of the Town’s Operation and Maintenance Plan.

### Procedures

The Town of Wenham will implement the following fuel and oil handling procedures to help reduce the discharge of pollutants from the MS4:

#### General Guidelines

For all manners of fuel and oil handling described below, a member of the facility’s Pollution Prevention Team (if the facility has a SWPPP) or another knowledgeable person familiar with the facility should be present during handling procedures. This person should ensure that the following are observed:

- There is no smoking while fuel handling is in process or underway.
- Sources of flame are kept away while fuel handling is being completed. This includes smoking, lighting matches, carrying any flame, or carrying a lighted cigar, pipe, or cigarette.
- The delivery vehicle’s hand brake is set, and wheels are chocked while the activity is being completed.
- Catch basins and drain manholes are adequately protected.
- No tools are to be used that could damage fuel or oil containers or the delivery vehicle.
- No flammable liquid should be unloaded from any motor vehicle while the engine is operating unless the engine of the motor vehicle is required to be used for the operation of a pump.
- Ensure that local traffic does not interfere with fuel transfer operations. If it does, make appropriate accommodations.
- The attending persons should watch for any leaks or spills:
  - Any small leaks or spills should be immediately stopped, and spilled materials absorbed and disposed of properly. Follow the procedures in SOP C.3: Spill Response and Cleanup.
  - In the event of a large spill or one that discharges to surface waters or an engineered storm drain system, the facility representative should activate the facility’s Stormwater Pollution Prevention Plan (SWPPP) and report the incident as specified in the document.

#### Delivery by Bulk (Tanker) Truck

Procedures for the delivery of bulk fuel should include the following:

- The truck driver should check in with the facility upon arrival.

- The facility representative should ensure that the appropriate spill cleanup and response equipment and personal protective equipment are readily available and easily accessible. Refer to SOP C.3: Spill Response and Cleanup for examples of spill cleanup and response materials.
- The facility representative should check to ensure that the amount of delivery does not exceed the available capacity of the tank.
  - A level gauge can be used to verify the level in the tank.
  - If a level gauge is not functioning or is not present on the tank, the tank should be stick tested prior to filling.
- The truck driver and the facility representative should both remain with the vehicle during the delivery process.
- The truck driver and the facility representative should inspect all visible lines, connections, and valves for leaks.
- When delivery is complete and the hoses are removed, buckets should be placed underneath connection points to catch drippings.
- The delivery vehicle should be inspected prior to departure to ensure that the hose is disconnected from the tank.
- The facility representative should inspect the fuel tank to verify that no leaks have occurred, or that any leaked or spilled material has been cleaned and disposed of properly.
- The facility representative should gauge tank levels to ensure that the proper amount of fuel is delivered and collect a receipt from the truck driver.

### **Delivery of Drummed Materials**

Drummed materials may include motor oil, hydraulic fluid, transmission fluid, or waste oil from another facility (as approved). Procedures for the delivery of drummed materials should include the following:

- The truck driver should check in with the facility upon arrival.
- The facility representative should ensure that the appropriate spill cleanup and response equipment and personal protective equipment are readily available and easily accessible. Refer to SOP C.3: Spill Response and Cleanup for examples of spill cleanup and response materials. The facility representative should closely examine the shipment for damaged drums.
  - If damaged drums are found, they should be closely inspected for leaks or punctures.
  - Breached drums should be removed to a dry, well-ventilated area and the contents transferred to other suitable containers.
  - Drums should be disposed of in accordance with all applicable regulations.
- Drummed materials should not be unloaded outdoors during wet weather events.
- The truck driver and the facility representative should both remain with the vehicle during the delivery process.
- Drums should be handled and unloaded carefully to prevent damage.
- Upon completion of unloading, the facility representative should inspect the unloading point and the drums to verify that no leaks have occurred, that any leaked or spilled material has been cleaned up and disposed of properly, and that the unloaded drums are not leaking.
- The facility representative should check to ensure that the proper amount of fuel or other material is delivered and collect a receipt from the truck driver.

### Removal of Waste Oil from the Facility

When waste oil or similar oil products need to be removed from the premises, only haulers certified to transport waste oil should be utilized. Procedures should include the following:

- The disposal truck driver should check in with the facility upon arrival.
- The facility representative should ensure that the appropriate spill cleanup and response equipment and personal protective equipment are readily available and easily accessible. Refer to SOP C.3: Spill Response and Cleanup for examples of spill cleanup and response materials. The truck driver and the facility representative should both remain with the vehicle during the tank draining process.
- When draining is complete and the hoses are removed, buckets should be placed underneath connection points to catch drippings.
- The facility representative should inspect the loading point and the tank to verify that no leaks have occurred, or that any leaked or spilled material has been cleaned up and disposed of properly.
- The facility representative should collect a receipt from the truck driver.
- When draining bulk oil tanks:
  - The facility representative should verify that the volume of waste oil in the tank does not exceed the available capacity of the disposal hauler's vehicle.
  - The disposal hauler vehicle should be inspected prior to departure to ensure that the hose is disconnected from the tank.

### Employee Training

- Employees who handle or deliver fuel and/or oil are trained once per year on proper procedures.
- Employees are also trained on stormwater pollution prevention, illicit discharge detection and elimination (IDDE) procedures, and spill and response procedures.
- If services are contracted, the contractor should be given a copy of this and any applicable SOPs to ensure compliance with MS4 regulations.

### Attachments

1. Fuel Delivery Checklist

### Related Standard Operating Procedures

- C.3: Spill Response and Cleanup

## C.2: Hazardous Materials Storage and Handling

### Introduction

A hazardous material is any biological, chemical, or physical material with properties that make it dangerous or potentially harmful to human health or the environment. Hazardous materials can be released to the environment in a variety of ways. When hazardous materials come into contact with rain or snow, the pollutants are washed into the storm sewer system and to surface waterbodies and/or groundwater. Hazardous materials associated with municipal facilities and their operations include, but are not limited to, oil, gasoline, antifreeze, fertilizers, pesticides, and de-icing agents and additives.

Municipally owned or managed facilities where hazardous materials are commonly stored and handled include:

- Equipment storage and maintenance yards
- Hazardous waste disposal facilities
- Hazardous waste handling and transfer facilities
- Composting facilities
- Materials storage yards
- Municipal buildings and facilities (e.g., schools, libraries, police and fire departments, town offices, municipal pools, and parking garages)
- Public works yards
- Solid waste handling and transfer facilities
- Vehicle storage and maintenance yards
- Water and wastewater facilities

Minimizing or eliminating contact of hazardous materials with stormwater can significantly reduce pollution of receiving waters. Proper hazardous material handling and storage also contributes to employee health, an organized workplace, and efficient operations. The goal of this written Standard Operating Procedure (SOP) is to provide guidance to municipal employees to help prevent stormwater pollution resulting from the handling and storage of hazardous materials. If services are contracted, this SOP should be provided to the contractor. The contract should also specify that the contractor is responsible for compliance with all applicable laws.

The Town of Wenham undertakes various activities regarding handling and storing hazardous materials. These activities are outlined in Section 3.2 of the Town's Operation and Maintenance Plan.

### Procedures

The Town of Wenham will implement the following procedures for handling and storing hazardous materials to reduce the discharge of pollutants to the MS4:

#### Handling, Loading, and Unloading

- Avoid loading/unloading materials in the rain and/or provide cover.
- Retrace areas where materials have been transferred to identify spills. If spills are found, immediately

clean them up. Follow procedures in SOP C.3: Spill Response and Cleanup.

- Time delivery and handling of materials during favorable weather conditions whenever possible (e.g., avoid receiving loads of sand during windy weather).
- Inspect containers for material compatibility and structural integrity prior to loading/unloading any raw or waste materials.
- Use dry cleanup methods (e.g., squeegee and dust pan, sweeping, and absorbents as last step) rather than hosing down surfaces.

### **Material Storage**

- Confine material storage indoors whenever possible. Plug or disconnect floor drains that lead to the stormwater system.
- Confine outdoor material storage to designated areas that are covered, on impervious surfaces, away from high traffic areas, and outside of drainage pathways.
- Store containers on pallets or equivalent structures to facilitate leak inspection and to prevent contact with wet floors that can cause corrosion. This technique also reduces incidences of container damage by insects and rodents.
- Store materials and waste in materially compatible containment units.
- Keep hazardous materials in their original containers.
- If materials are not in their original containers, clearly label all storage containers with the name of the chemical, the expiration date, and handling instructions.
- Maintain an inventory of all raw and waste materials to identify leakage. Order new materials only when needed.
- Provide secondary containment for storage tanks and drums with sufficient volume to store 110 percent of the volume of the material.
- Provide sufficient aisle space to allow for routine inspections and access for spill cleanup.
- Inspect storage areas for spills or leaks and containment units for corrosion or other failures.

### **Waste Treatment, Disposal, and Cleanup**

- Adopt a regular schedule for the pick-up and disposal of waste materials.
- Recycle leftover materials whenever possible.
- Substitute nonhazardous or less-hazardous materials for hazardous materials whenever possible.
- Protect empty containers from exposure to stormwater and dispose of them regularly to avoid contamination from container residues.

### **Employee Training**

- Employees who handle and use hazardous materials are trained once per year on these procedures.
- Employees are also trained on stormwater pollution prevention, illicit discharge detection and elimination (IDDE) procedures, and spill and response procedures.
- If services are contracted, the contractor should be given a copy of this and any applicable SOPs to ensure compliance with MS4 regulations.

## C.3: Spill Response and Cleanup

### Introduction

Municipalities are responsible for any contaminant spill or release that occurs on property that they own or operate. Particular areas of concern include any facilities that use or store chemicals, fuel oil, or hazardous waste, including schools, garages, and landfills. Implementation of proper spill response and cleanup procedures can help to mitigate the effects of a contaminant release. The goal of this written Standard Operating Procedure (SOP) is to provide guidance to municipal employees to help reduce the discharge of pollutants from the MS4 as a result of spills or releases.

### Procedures

The Town of Wenham will implement the following spill response and cleanup procedures to reduce the discharge of pollutants from the MS4:

#### Responding to a Spill

Employees should be trained in proper spill response specific to the materials used at their site and appropriate personal protective equipment (PPE). In the event of a spill, follow these spill response and cleanup procedures:

- If the facility has a Stormwater Pollution Prevention Plan (SWPPP), notify a member of the facility's Pollution Prevention Team, the facility supervisor, and/or the facility safety officer (fill out the attached spill response contact list). If not, continue to follow the procedures outlined below.
- Assess the contaminant release site for potential safety issues and for direction of flow.
- Complete the following:
  - Stop the contaminant release.
  - Contain the contaminant release through the use of spill containment berms or absorbents.
  - Protect all drains and/or catch basins with the use of absorbents, booms, berms or drain covers.
  - Clean up the spill.
  - Dispose of all contaminated products in accordance with applicable federal, state and local regulations.
    - i. Soil contaminated with petroleum should be handled and disposed of as described in MassDEP policy WCS-94-400, Interim Remediation Waste Management Policy for Petroleum Contaminated Soils (<https://www.mass.gov/files/documents/2016/08/mq/94-400.pdf>).
    - ii. Products saturated with petroleum products or other hazardous chemicals require special handling and disposal by licensed transporters. Licensed transporters will pick up spill contaminated materials for recycling or disposal. Save the shipping records for at least three years.
    - iii. Waste oil contaminated industrial wipes and sorptive minerals:
      - 1. Perform the "one drop" test to ensure absorbents do not contain enough oil to be considered hazardous, as described in the MassDEP Waste Oil Management Guide (<https://www.mass.gov/files/documents/2018/12/18/oilwiper.pdf>).

2. Wring absorbents through a paint filter. If doing so does not generate one drop of oil, the materials are not hazardous.
  3. If absorbents pass the “one drop” test they may be discarded in the trash unless contaminated with another hazardous waste.
    - a. It is acceptable to mix the following fluids and handle them as waste oil:
      - i. Waste motor oil
      - ii. Hydraulic fluid
      - iii. Power steering fluid
      - iv. Transmission fluid
      - v. Brake fluid
      - vi. Gear oil
    - b. **Do not mix** the following materials with waste oil. Store each separately:
      - i. Gasoline
      - ii. Antifreeze
      - iii. Brake and carburetor cleaners
      - iv. Cleaning solvents
      - v. Other hazardous wastes
  4. If absorbents do not pass the “one drop” test they should be placed in separate metal containers with tight fitting lids, labeled “Oily Waste Absorbents Only.”
- If you need assistance containing and/or cleaning up the spill, or preventing it from discharging to a surface water (or an engineered storm drain system), contact your local fire department using the number listed below. **In the case of an emergency call 911.**
    - Wenham Fire Department: (978) 468-5508
  - Contact the MassDEP 24-hour spill reporting notification line, toll-free at **(888)-304-1133**;
    - The following scenarios **are exempt** from MassDEP reporting requirements (see the MassDEP factsheet on oil and hazardous materials handling for more information: <https://www.mass.gov/files/documents/2016/08/xm/spillmgm.pdf>).
      - i. Spills that are less than 10 gallons of petroleum and do not impact a water body
      - ii. Spills that are less than one pound of hazardous chemicals and do not present an imminent health or safety hazard
      - iii. Fuel spills from passenger vehicle accidents
      - iv. Spills within a vault or building with a watertight floor and walls that completely contain all released chemicals

### Reporting a Spill

When contacting emergency response personnel or a regulatory agency, or when reporting the contaminant release, be prepared to provide the following information:

1. Your name and the phone number you are calling from.
2. The exact address and location of the contaminant release.
3. Specifics of release, including:
  - a. What was released;
  - b. How much was released, which may include:

- i. Pounds
    - ii. Gallons
    - iii. Number of containers
4. Where was the release sent/what was contaminated, addressing:
  - a. Pavement
  - b. Soil
  - c. Drains
  - d. Catch basins
  - e. Water bodies
  - f. Public streets
  - g. Public sidewalks
5. The concentration of the released contaminant.
6. What/who caused the release.
7. Is the release being contained and/or cleaned up or is the response complete.
8. Type and amount of petroleum stored on site, if any.
9. Characteristics of contaminant container, including:
  - a. Tanks
  - b. Pipes
  - c. Valves

### **Maintenance and Prevention Guidance**

Prevention of spills is preferable to even the best response and cleanup. To mitigate the effects of a contaminant release, provide proper maintenance and inspection at each facility. To protect against contaminant release adhere to the following guidance:

- Ensure all employees are properly trained to respond in the case of a spill, understand the nature and properties of the contaminant, and understand the spill control materials and personnel safety equipment. Maintain training records of current personnel on site and retain training records of former personnel for at least three years from the date last worked at the facility.
- Provide yearly maintenance and inspection at all municipal facilities, paying particular attention to underground storage tanks. Maintain maintenance and inspection records on site.
- Implement good management practices where chemicals and hazardous wastes are stored:
  - a. Ensure storage in closed containers inside a building and on an impervious surface wherever possible.
  - b. If storage cannot be provided inside, ensure secondary containment for 110 percent of the maximum volume of the storage container.
  - c. Locate storage areas near maintenance areas to decrease the distance required for transfer.
  - d. Provide accurate labels, Material Safety Data Sheets (MSDS) information, and warnings for all stored materials.
  - e. Regularly inspect storage areas for leaks.
  - f. Ensure secure storage locations, preventing access by untrained or unauthorized persons.
  - g. Maintain accurate records of stored materials.
- Replace traditional hazardous materials such as pesticides and cleansers with non-hazardous products such as bio-lubricants which can reduce response costs in the case of a spill.

Maintain appropriately stocked spill response kits at each facilities and locations where oil, chemicals, or other hazardous materials are handled and stored.

### **Employee Training**

- Employees who perform work with potential stormwater pollutants are trained once per year on proper spill procedures.
- Employees are also trained on stormwater pollution prevention and illicit discharge detection and elimination (IDDE) procedures.
- If services are contracted, the contractor should be given a copy of this and any applicable SOPs to ensure compliance with MS4 regulations.

### **Attachments**

1. Spill Response and Cleanup Contact List

## C.4: Operations and Maintenance of Municipal Buildings and Facilities

### Introduction

Municipal buildings and facilities (schools, municipal offices, police and fire stations, municipal pools, parking garages, etc.) often house various chemicals, such as petroleum products and hazardous materials. As a result, these buildings and facilities are potential sources of pollutant discharges to the storm drainage system. The goal of this written Standard Operating Procedure (SOP) is to provide guidance to municipal employees on the use, storage, and disposal of chemicals and other stormwater pollutants to reduce the discharge of pollutants from the MS4. If services are contracted, this SOP should be provided to the contractor. The contract should specify that the contractor is responsible for compliance with all applicable laws.

The Town of Wenham performs a variety of operations and maintenance activities at its municipally owned and operated buildings, as mentioned in the Operation and Maintenance Plan. An inventory of all municipal buildings and facilities is included in Appendix A of that plan and will be updated annually.

### Procedures

The Town of Wenham will implement the following procedures for municipally owned or operated buildings and facilities to reduce the discharge of pollutants from the MS4:

#### **Handling, Storage, Transfer, and Disposal of Trash and Recyclables**

All liquid and solid waste must be disposed of properly. Some of the most common sources of pollution at municipal facilities are a result of littering, improper collection of debris, and improper disposal of solid or liquid waste.

- All waste and recycling receptacles must be leak-tight with tight-fitting lids or covers.
- Always keep lids on dumpsters and containers closed unless adding or removing material. If using an open-top roll-off dumpster, cover it and tie it down with a tarp unless adding materials.
- Place waste or recycling receptacles indoors or under a roof or overhang whenever possible.
- Locate dumpsters on a flat, paved surface and install berms or curbs around the storage area to prevent run-on and run-off.
- Do not locate dumpsters over or adjacent to catch basins.
- Prior to transporting waste, trash, or recycling, ensure that containers are not leaking (double bag if needed) and properly secure containers to the vehicle.
- Clean and sweep up around outdoor waste containers regularly.

- Clean up any liquid leaks or spills with dry cleanup methods.
- Arrange for waste or recycling to be picked up regularly and disposed of at approved disposal facilities.
- Never place hazardous materials, liquids, or liquid-containing wastes in a dumpster or recycling or trash container (see SOP C.2: Hazardous Materials Storage and Handling).
- Do not wash trash or recycling containers outdoors or in parking lots.
- Conduct periodic inspections of solid and liquid waste storage areas to check for leaks and spills.
- Conduct periodic inspections of work areas to ensure that all wastes are being disposed of properly.
- In dumpster areas, regularly pick up surrounding trash and debris and regularly sweep the area.
- In compactor areas, regularly check the hydraulic fluid hoses and reservoir to ensure that there are no cracks or leaks. Regularly sweep the area.

### **Building Maintenance**

- When power washing buildings and facilities, ensure that the washwater does not flow into the storm system. Containment or filtering systems should be provided.
- Paint and other chemicals should not be applied on the outside of buildings when it is raining or prior to expected rain.
- When sanding, painting, power washing, etc., ensure that sites are properly prepared (e.g., use tarps) and cleaned (e.g., use dry cleaning methods) especially if they are near storm drains. Protect catch basins when maintenance work is conducted upgradient of them.
- When painting, use a drop cloth and clean up any spills immediately.
- Do not leave open containers on the ground where they may accidentally tip over.
- Buildings should be routinely inspected for areas of potential leaks.
- Do not discharge chlorinated pool water into the stormwater system. Water must be properly dechlorinated and tested before it is discharged.
- Streets and parking lots surrounding municipal buildings and facilities should be swept and kept clean to reduce runoff of pollutants and debris to the stormwater system.
- Streets and parking lots around buildings and facilities will be swept in accordance with the procedures in SOP F.1: Streets and Parking Lots.

### **Storage of Petroleum Products and Potential Pollutants**

- Floor drains in storage areas should be disconnected from the stormwater system.
- Routinely inspect buildings and facilities for areas of potential leaks.
- For storage and handling procedures of petroleum products and potential pollutants, refer to SOP C.2: Hazardous Materials Storage and Handling and SOP C.1: Fuel and Oil Handling Procedures.
- Should the Town begin to store and apply fertilizer, herbicides, or pesticides, a separate SOP shall be developed for all activities relevant to those potential pollutants.
- All municipal buildings and facilities should be periodically inspected to address potential pollutant sources (e.g., leaks).

**Spill Prevention Plan**

- Spill prevention plans such as Spill Prevention Control and Countermeasure (SPCC) Plans should be in place where applicable, based on inventories of material storage and potential pollutants. Coordinate with the local fire department if necessary.
- Spill SOPs are outlined in SOP C.3: Spill Response and Cleanup.

**Employee Training**

- Employees who perform maintenance or other applicable work at municipal buildings and facilities are trained once per year on these procedures and the proper operation of related equipment.
- Employees are also trained on stormwater pollution prevention, illicit discharge detection and elimination (IDDE) procedures, and spill and response procedures.
- If services are contracted, the contractor should be given a copy of this and any applicable SOPs to ensure compliance with MS4 regulations.

**Related Standard Operating Procedures**

1. C.1: Fuel and Oil Handling
2. C.2: Hazardous Material Storage and Handling
3. C.3: Spill Response and Cleanup
4. F.1: Street Sweeping

## Spill Response and Cleanup Contact List

Contact	Phone Number	Date and Time Contacted
Safety Officer: Sargent Marsh	<b>(978)-468-5500</b>	
Facility Supervisor: Bill Tyack	<b>(978)-490-7036</b>	
Fire Department: Wenham Fire Department	<b>(978)-468-5508</b>	
MassDEP 24-Hour Spill Reporting	<b>(888)-304-1133</b>	
MassDEP Regional Offices:		
Northeast Regional Office	<b>(978) 694-3200</b>	
Southeast Regional Office	<b>(508) 946-2700</b>	
Central Regional Office	<b>(508) 792-7650</b>	
Western Regional Office	<b>(413) 784-1100</b>	
Hazardous Waste Compliance Assistance Line	<b>(617) 292-5898</b>	
Household Hazardous Products Hotline	<b>(800) 343-3420</b>	
Massachusetts Department of Fire Services	<b>(978) 567-3100 or (413) 587-3181</b>	
Licensed Site Professionals Association (Wakefield, MA)	<b>(781) 876-8915</b>	
Licensed Site Professionals Board	<b>(617) 556-1091</b>	

**FUEL DELIVERY FORM**  
**TOWN OF WENHAM**

**Date:** \_\_\_\_\_  
**Time of Arrival:** \_\_\_\_\_  
**Time of Departure:** \_\_\_\_\_  
**Truck Number:** \_\_\_\_\_  
**Name of Truck Driver:** \_\_\_\_\_  
**Name of Town Employee:** \_\_\_\_\_

**BEFORE UNLOADING:**

Is all spill response equipment and personal protective equipment in place?

Yes  No

In the case of bulk fuel delivery, does tank capacity exceed the amount of delivery?

Yes  No  N/A

In the case of drum fuel delivery, are all drums free of leaks and punctures?

Yes  No  N/A

**COMMENCE UNLOADING. REMAIN WITH VEHICLE AT ALL TIMES.**

**AFTER UNLOADING IS COMPLETE:**

Have all fuel containers, including the vehicle, been inspected for leaks?

Yes  No

Has the ground at the unloading point been inspected for evidence of leaks?

Yes  No

If there are any leaks or spills, has the material been properly cleaned?

Yes  No

Has the correct amount of fuel been delivered?

Yes  No

Has a receipt been collected?

Yes  No

**DELIVERY IS COMPLETE.**

# SOP 12: Storage and Use of Pesticides and Fertilizer

## Introduction

The use and improper storage of pesticides, herbicides, and fertilizers can contribute to the discharge of nutrients and toxic compounds to the municipal storm drainage system and surface waters. The goal of this Standard Operating Procedure (SOP) is to provide guidance on municipal employees on proper handling and storage of pesticides, herbicides, and fertilizers to prevent the discharge of pollutants from the MS4.

The Town of Wenham only uses fertilizer once per year at Pingree Park in the fall, after all seasonal field use is complete.

## What is the schedule of fertilizing? I will know

## Procedures

Below are procedures for the storage and use of fertilizers, pesticides, and herbicides by municipal employees. In this section, the term “pesticide” include products used as herbicides. Refer to SOP 4: Spill Response and Cleanup and SOP 17: Hazardous Materials Storage and Handling for information on and handling spills and hazardous materials.

### *Storage*

- Store pesticides and fertilizers in high, dry locations in accordance with the manufacturer’s specifications.
- Store in cool, well-ventilated, and insulated areas to protect against temperature extremes.
- Store in areas that have been constructed in accordance with local fire codes for storing flammable or combustible materials.
  - Flammable products should be stored separately from non-flammable products, preferably in a fire-proof cabinet.
  - Small quantities (less than 500 lbs. or 220 gallons) of pesticides can be stored in cabinets constructed of double-walled 18-gauge sheet metal.
  - Large quantities (greater than 500 lbs. or 220 gallons) of pesticides can be stored in a prefabricated Hazardous Material Storage building or in a purpose-built storage facility. It is not anticipated that many municipal facilities will store quantities in excess of 500 lbs. or 220 gallons of pesticides.
  - Building walls should have a two-hour fire rating and be impervious to the stored materials.
  - Floors should be watertight, impervious, and provide spill containment.
- Store materials in an enclosed area or in covered, impervious containment, such as a locked cabinet. The cabinet should be located in a first story room or one that has direct access to the outdoors. Storage areas should be equipped with easily accessible spill cleanup materials and portable firefighting equipment. Regularly inspect storage areas for leaks and spills. Emergency eyewash stations and emergency drench showers should be located near the storage area.
- For pesticides, storage cabinets should be kept locked and the door to the storage area should contain a weather proof sign that warns of the existence and danger of the pesticides inside. The

door should be kept locked. The sign should be visible at a distance of 25 feet and should read as follows:

**DANGER**  
**PESTICIDE STORAGE AREA**  
**ALL UNAUTHORIZED PERSONS KEEP OUT**  
**KEEP DOORS LOCKED WHEN NOT IN USE**

The sign should be posted in both English and any other language used by maintenance workers.

- Pesticides should not be stored in the same place as ammonium nitrate fertilizer.
- Separate pesticides and fertilizers from other chemical storage and other flammable materials.
- Label all containers with date of purchase. Clearly label all secondary containers. Use older materials first.
- Order for delivery as close to the time of use as possible to reduce the amount of chemicals stored at the facility.
- Order only the amount of materials needed in order to minimize excess or obsolete materials, which require storage and disposal.
- Never leave unlabeled or unstable pesticides and fertilizers in uncontrolled locations.
- Maintain a current written inventory of all pesticides and fertilizers at the storage site.
- Ensure that contaminated waste materials are kept in designated containers and stored in labeled, designated, covered, and contained areas.
- Dispose of excess or obsolete pesticides/fertilizers and associated waste materials in accordance with the manufacturer's specification and all applicable regulations.

### ***Use and Application of Fertilizers***

- All fertilizer products manufactured or distributed in the State of Massachusetts must be registered with the Department of Agricultural Resources.
- Perform soil testing before choosing a fertilizer. The quantity of available nutrients already present in the soil will determine the type and amount of fertilizer that is recommended. The soil test will also determine the soil pH, humic matter, texture, and exchangeable acidity, which will indicate whether pH adjustment is required for fertilizer to work efficiently. A soil test should be completed at each facility, as soil type can vary widely within a single community.
  - Soil tests are recommended every 3-4 years for turf and plantings (more frequently for problem or newly planted areas) and every year for soil where phosphorus-containing fertilizers are used. Soil pH tests should be conducted every year for all sites.
  - When collecting soil samples, take multiple samples for each target area at a four-inch depth; mix the samples together in a container and properly label the sample with property information and site use type. Separately sample areas that have discoloration, abnormal plant growth, or other problems. Take the sample at approximately the same time every year. If the area has been fertilized, wait eight weeks after fertilizing to test the soil to ensure nutrients have been absorbed.
- When selecting the optimal type of fertilizer to use on an area, consider the soil test results, type of turf, and type of turf use. Slow-use fertilizer should be used for turf grass.

- Calibrate application equipment regularly to ensure proper application and loading rates.
- Mix fertilizers using clean application equipment under cover in an area where accidental spills will not enter surface water or groundwater and will not contaminate the soil.
- Fertilizers should only be applied by properly trained personnel.
- Never apply fertilizers in quantities exceeding the manufacturer's instructions. Instead, apply small amounts throughout the growing season.
- Time fertilizer application methods for maximum plant uptake, usually in the fall and spring (e.g., between April 15 and October 15). When applying at the beginning and end of planting season, take into consideration the slower uptake rate of fertilizer by plants and adjust the fertilizer application accordingly.
- Never apply fertilizer during a drought, when the soil is dry or frozen, when it is raining, or immediately before expected rain.
- Fertilizer should be applied when the ground temperature is above 55° F.
- Apply fertilizers in amounts appropriate for the type of vegetation to minimize losses to surface water and groundwater. Use the results of the soil test to determine optimal fertilizer timing and application rates.
- Where applicable, till fertilizers into the soil rather than dumping or broadcasting (proper application techniques will depend on the type of soil and vegetation).
- Do not hose down paved areas after fertilizer application if drainage will enter into an engineered storm drain system or drainage ditch.
- Limit irrigation after fertilizer application to prevent runoff (approximately ½ inch of water per application for a week following application).
- Turn off irrigation systems during periods of adequate rainfall.
- Do not over-apply fertilizer in late fall to “use it up” before winter. The effectiveness of fertilizer does not reduce when stored.
- If phosphorus fertilizer is used when re-seeding, mix the phosphorus into the root zone. Do not apply directly to the soil surface.
- Avoid combined products such as “weed and feed,” which do not target specific problems at the appropriate time.

### ***Use and Application of Pesticides and Herbicides***

The State of Massachusetts has a stringent program for registration of pesticides and certification of those authorized to apply them. Once a pesticide has been approved for use by the USEPA, it must be registered by the Massachusetts Pesticide Board Subcommittee prior to being distributed, purchased, or used in Massachusetts. Pesticide classification in Massachusetts is based on the potential adverse effects the pesticide may have on humans or the environment. “Restricted Use” pesticides can only be sold by Licensed Dealers to Certified Applicators, while “State Limited Use” pesticides may be restricted to use by certain individuals or require written permission from the Department of Agricultural Resources prior to use. Legal application of pesticides must be performed by an individual licensed or certified by the Massachusetts Department of Agricultural Resources. A Commercial Applicator License is required for applying general use pesticides, and a Commercial Applicator Certification is required for applying restricted and state limited use products.

***Use and Application of Pesticides***

- Pesticides should only be applied by licensed or certified applicators.
- Calibrate application equipment regularly to ensure proper application and loading rates.
- Ensure that pesticide application equipment is capable of immediate shutoff in case of emergency.
- Conduct spray applications according to specific label directions and applicable local regulations.
- Never apply pesticides in quantities exceeding the manufacturer's instructions.
- Apply pesticides at the life stage when the pest is most vulnerable.
- Never apply pesticides if it is raining or immediately before expected rain.
- Establish setback distances from pavement, storm drains, and waterbodies, which act as buffers from pesticide application, with disease-resistant plants and minimal mowing.
- Do not apply pesticides within 100 feet of open waters or of drainage channels.
- Spot treat infected areas instead of the entire location.
- Mix pesticides and clean application equipment under cover in an area where accidental spills will not enter surface water or groundwater and will not contaminate soil.
- Do not hose down paved areas after pesticide application to a storm drain or drainage ditch.
- Recycle rinse from equipment cleaning back into product.
- Choose the least toxic pesticide that is still capable of reducing the infestation to acceptable levels.
- Use alternatives to pesticides, such as manual weed control, biological controls, and Integrated Pest Management strategies (learn more at: <https://www.mass.gov/files/documents/2016/08/wk/ipm-kit-for-bldg-mgrs.pdf>).
- For the use of herbicides, reduce seed release of weeds by timing cutting and pesticide application at seed set. Select vegetation and landscaping that is low-maintenance in order to tolerate low levels of weeds without interfering with aesthetics.

**Employee Training**

- Employees who handle pesticides, fertilizers, and herbicides are trained once per year on proper handling and storage procedures.
- Employees are also trained on stormwater pollution prevention, illicit discharge detection and elimination (IDDE) procedures, and spill and response procedures.
- If services are contracted, the contractor should be given a copy of this and any applicable SOPs to ensure compliance with MS4 regulations.

**Related Standard Operating Procedures**

- SOP 4: Spill Response and Cleanup
- SOP 17: Hazardous Materials Storage and Handling

## APPENDIX D

### Standard Operating Procedures – Municipal Vehicles and Equipment

#### D.1: Operation and Maintenance of Municipal Vehicles and Equipment

# D.1: Operations and Maintenance of Municipal Vehicles and Equipment

## Introduction

Regular maintenance of both municipal and contracted vehicles and heavy equipment not only prolongs the life of municipal assets but also helps reduce the potential for leaking of fluids associated with normal wear and tear. Potential pollutants include fuels, oil, antifreeze, brake fluid, solvents, and battery acid. The goal of this written Standard Operating Procedure (SOP) is to provide guidance to municipal employees to help reduce the discharge of pollutants from the MS4 because of leaks from vehicles and equipment. If services are contracted with respect to vehicles and equipment, this SOP should be provided to the contractor. The contract should also specify that the contractor is responsible for compliance with all applicable laws.

The Town of Wenham undertakes various procedures regarding its municipal vehicles and equipment, which are explained in detail in Section 4.0 of the Town's Operation and Maintenance Plan. An inventory of all municipal vehicles and equipment is included in Appendix A of that Plan and updated annually.

## Procedures

The Town of Wenham will implement the following procedures for municipally owned and operated vehicles and equipment to reduce the discharge of pollutants from the MS4:

### Vehicle and Equipment Maintenance

#### *Vehicle Storage*

- Monitor vehicles and equipment for leaks and use drip pans as needed until repairs can be performed.
- When drip pans are used, avoid overtopping.
- Drain fluids from leaking or wrecked vehicles and parts as soon as possible. Dispose of fluids properly.
- Store and park vehicles on impervious surfaces and/or under cover or indoors whenever possible.

#### *Vehicle Maintenance*

- Conduct routine inspections of heavy equipment and vehicles to proactively identify maintenance needs or potential leaks.
- Perform routine preventive maintenance to ensure heavy equipment and vehicles are operating optimally.
- Recycle or dispose of waste properly and promptly.
- Sweep and pick up trash and debris as needed.
- Do not dump any liquids or other materials outside, especially near or in storm drains or ditches.

***Body Repair and Painting***

- Conduct all body repair and painting work indoors.
- Minimize waste from paints and thinners. Calculate paint needs based on surface area.
- Use dry cleanup methods (vacuum, sweep) to clean up metal filings and dust and paint chips from grinding, shaving and sanding. Sweep debris from wet sanding after allowing it to dry overnight on the shop floor. Dispose of waste properly; never dump waste into storm or sanitary sewers.
- Use sanding tools equipped with vacuum capability to pick up debris and dust.

***Fueling***

- Fueling areas owned or operated by the municipality should be covered.
- Fueling areas should be evaluated to ensure that pollutants (e.g., gasoline or oil) do not enter the MS4. Follow the procedures in SOP C.1: Fuel and Oil Handling.

***Material Management***

- Store materials and waste in labeled containers under cover and in secondary containment.
- Chemicals should not be combined in containers.
- Hazardous waste must be labeled and stored according to hazardous waste regulations. Follow the procedures in SOP C.2: Hazardous Materials Storage and Handling.
- Carefully transfer collected fluids from containers into designated storage areas as soon as possible.
- Store new and used batteries securely to avoid breakage. Store indoors or in secondary containment to contain potential acid leaks. Recycle used batteries.
- Conduct periodic inspections of storage areas to detect possible leaks.
- Do not wash or hose down storage areas unless there is prior approval to collect and discharge the water into the sanitary sewer. Use dry cleanup methods whenever possible.
- Keep lids on containers. Store them indoors or under cover to reduce exposure to rain.
- Inspect and maintain all pretreatment equipment, including interceptors, according to the manufacturer's maintenance schedule and at least once per year.
- Proper spill protocol should be followed to prevent chemicals from entering the stormwater system. Follow the procedures in SOP C.3: Spill Response and Cleanup.

***Parts Cleaning***

- Use designated areas for engine, parts, or radiator cleaning. Do not wash or rinse parts outdoors. If parts cleaning equipment is not available, then capture parts cleaning fluids.
- Recycle cleaning solution. Never discharge waste to the sanitary sewer or storm sewer.
- Use steam cleaning or pressure washing of parts instead of solvent cleaning. Cleaning equipment must be connected to an oil/water interceptor prior entering the sanitary sewer.
- When using solvents for cleaning, drain parts over the solvent tank to avoid drips to the floor. Catch excess solutions and divert them back to tank. Allow parts to dry over the hot tank.

### **Vehicle and Equipment Washing**

Vehicle washing can result in the discharge of nutrients, sediment, petroleum products, and other contaminants to a surface water body or to a stormwater system. The MS4 Permit does not authorize the discharge of municipal vehicle washing byproducts into the MS4.

#### ***Outdoor Vehicle Washing Procedures***

Outdoor washing of municipal vehicles should be avoided unless wash water is contained in a tight tank or similar structure. Where no alternative wash system is available, and full containment of wash water cannot be achieved, adhere to the following procedures:

- Avoid discharge of any wash water directly to the storm drainage system or surface water (e.g., stream, pond, or drainage swale)
- Minimize the use of water to the extent practicable.
- Where the use of detergent cannot be avoided, use products that do not contain regulated contaminants. The use of a biodegradable, phosphate-free detergent is preferred.
- Do not use solvents except in dedicated solvent parts washer systems or in areas not connected to a sanitary sewer.
- Do not power wash, steam clean, or perform engine or undercarriage cleaning.
- Grassy and pervious (porous) surfaces may be used to promote direct infiltration of wash water, providing treatment before recharging groundwater and minimizing runoff to an adjacent stormwater system. Pervious surfaces or other infiltration-based systems should not be used within wellhead protection areas or within other protected resources.
- Impervious surfaces discharging to the storm drainage system should not discharge directly to a surface water unless treatment is provided. The treatment device should be positioned such that all drainage must flow through the device, preventing bypassing or short-circuiting.
- Periodic sweeping and/or cleaning should be completed to prevent accumulation from forming on the washing area.
- Maintain absorbent pads and drip pans to capture and collect spills or noticeable leaks observed during washing activities. Follow the procedures in SOP C.3: Spill Response and Cleanup.
- Heavily soiled vehicles or vehicles dirtied from salting or snow removal efforts should follow the SOPs in the “Heavy Equipment Washing Procedures” below.

#### ***Indoor Vehicle Washing Procedures***

- Vehicles and equipment should be washed inside whenever possible to reduce runoff to the stormwater system.
- Where the use of detergent cannot be avoided, use products that do not contain regulated contaminants. The use of biodegradable, phosphate-free detergent is preferred.
- Detergents should not be used in areas where oil/water separators provide pre-treatment of drainage.
- Floor drains should be connected to a sanitary sewer or tight tank. Floor drains discharging to adjacent surface water bodies or engineered storm drain systems should be permanently plugged or otherwise abandoned before any vehicle wash activities are completed.
- Designate separate areas for routine maintenance and vehicle cleaning. This helps prevent

contamination of wash water by motor oils, hydraulic lubricants, greases, or other chemicals.

- Dry cleanup methods are recommended within garage facilities. Do not wash down floors and work areas with water.
- Bring smaller vehicles to commercial washing stations.
- Maintain absorbent pads and drip pans to capture and collect spills or noticeable leaks observed during washing activities. Follow the procedures in SOP C.3: Spill Response and Cleanup.

### ***Heavy Equipment Washing Procedures***

- Mud and heavy debris removal should occur on impervious surfaces or within a retention area.
- Maintain these areas with frequent mechanical removal and proper disposal of waste.
- Impervious surfaces with engineered storm drain systems should not discharge directly to a surface water.
- Floor drains should be connected to a sanitary sewer or tight tank. Floor drains discharging to adjacent surface waterbodies or engineered storm drain systems should be permanently plugged or otherwise abandoned before any vehicle wash activities are completed.
- Where the use of detergent cannot be avoided, use products that do not contain regulated contaminants. The use of biodegradable, phosphate-free detergent is preferred.
- Detergents should not be used in areas where oil/water separators provide pre-treatment of drainage.
- Maintain absorbent pads and drip pans to capture and collect spills or noticeable leaks observed during washing activities. Follow the procedures in SOP C.3: Spill Response and Cleanup.

### ***Engine and Steam Washing Procedures***

- Do not wash parts outdoors.
- Maintain drip pans and smaller containers to contain motor oils, hydraulic lubricants, greases, etc. and to capture and collect spills or noticeable leaks observed during washing activities, to the extent practicable. Follow the procedures in SOP C.3: Spill Response and Cleanup.
- Where use of detergent cannot be avoided, use products that do not contain regulated contaminants. The use of a biodegradable, phosphate-free detergent is preferred.
- Avoid cleaning with solvents except in dedicated solvent parts washer systems. Make use of pressure washing and steam cleaning.
- Recycle clean solutions and rinse water to the extent practicable.
- Wash water should discharge to a tight tank or a sanitary sewer via an oil/water separator. Detergents should not be used in areas where oil/water separators provide pre-treatment of drainage.

### **Employee Training**

- Employees who perform work on/with municipal vehicles or equipment are trained once per year on these procedures and the proper operation of related equipment.
- Employees are also trained on stormwater pollution prevention, illicit discharge detection and elimination (IDDE) procedures, and spill and response procedures.
- If services are contracted, the contractor should be given a copy of this and any applicable SOPs to ensure compliance with MS4 regulations.

## APPENDIX E

### Standard Operating Procedures – Catch Basin Inspection and Cleaning

#### E.1: Catch Basin Inspection and Cleaning

## E.1: Catch Basin Inspection and Cleaning

### Introduction

Catch basins help minimize flooding and protect water quality by removing trash, sediment, decaying debris, and other solids from stormwater runoff. These materials are retained in a sump below the invert of the outlet pipe (older catch basins may not have a sump). Catch basin cleaning reduces foul odors, prevents clogs in the storm drain system, and reduces the loading of trash, suspended solids, nutrients, bacteria, and other pollutants to receiving waters. The goal of this written Standard Operating Procedure (SOP) is to provide guidance to municipal employees on catch basin inspection and cleaning to reduce the discharge of pollutants from the MS4. If services are contracted, this SOP should be provided to the contractor. The contract should specify that the contractor is responsible for compliance with all applicable laws.

This SOP can also be used for inspection of catch basins or manholes for the purpose of conducting catchment investigations as part of the municipality's Illicit Discharge Detection and Elimination program.

The Wenham Highway Department performs routine inspections, cleaning, and maintenance on over 581 catch basins that are located within the Town of Wenham. The Town of Wenham will include an optimization plan for catch basin cleaning and inspection in its annual report. A description of current Town practices for catch basin cleaning and inspection is included in Section 5.2 of the Operation and Maintenance Plan.

Wenham will implement the following catch basin inspection and cleaning procedures to reduce the discharge of pollutants from the MS4:

### Procedures

#### Inspection and Cleaning Frequency

- Each catch basin should be cleaned and inspected at least annually.
- Catch basins near construction activities (roadway construction, residential, commercial, or industrial development or redevelopment) or high-use areas should be inspected and cleaned more frequently if inspection finds excessive sediments or debris loadings.
- Catch basins should be cleaned to ensure that they are no more than 50 percent full<sup>1</sup> at any time. Establish inspection and maintenance frequencies needed to meet this “50 percent” goal. If a catch basin sump is more than 50 percent full during two consecutive inspections, document the findings, investigate the contributing drainage area for sources of excessive sediment loading, and, if possible, address the contributing sources. If no contributing sources are found, increase the inspection and cleaning frequencies of the sump.
- Street sweeping performed on an appropriate schedule will reduce the amount of sediment, debris, and organic matter entering the catch basins, which will in turn reduce the frequency with which they need to be cleaned. Reference SOP 16: Streets and Parking Lots for information on appropriate street sweeping frequencies. Street sweeping schedules should also be adjusted based on catch basin inspection findings, with more frequent sweepings for areas with higher catch basin loads.

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<sup>1</sup> . A catch basin sump is more than 50 percent full if the contents within the sump exceed one half the distance between the bottom interior of the catch basin to the invert of the deepest outlet of the catch basin

### Inspection and Cleaning Procedures

Catch basin inspection and cleaning procedures should address both the grate opening and the catch basin structure, including the sump and any inlet and outlet pipes. Document any and all observations about the condition of the catch basin structure and water quality (an inspection form and log of catch basins cleaned or inspected are included in the attachments). Collect data on the condition of the physical basin structure, its frame, and the grate, as well as on the quality of stormwater conveyed by the structure. Observations like those below can indicate sources of pollution within the storm drain system:

- Oil sheen
- Discoloration
- Trash and debris

Both oil and bacteria can create a sheen on the water's surface. The source of a sheen can be differentiating by disturbing it (e.g., with a pole). A sheen caused by oil will remain intact and move in a swirl pattern, while a sheen caused by bacteria will separate and appear "blocky." The bacteria that cause this sheen are naturally occurring iron bacteria – they are not considered a pollutant but should be noted. Other types of bacteria, such as fecal bacteria, are considered pollutants and their discovery should be recorded

Observations like those below can indicate a potential connection of a sanitary sewer to the storm drain system, which is an illicit discharge:

- Indications of sanitary sewage, including fecal matter or sewage odors
- Foaming, such as from detergent
- Optical enhancers, fluorescent dye added to laundry detergent

In general, adhere to the following procedures when inspecting and cleaning catch basins. Record the findings in the log in the attachments:

1. Implement appropriate traffic safety procedures (e.g., traffic cones) prior to and during the catch basin inspection and cleaning process.
2. Work upstream to downstream in a given drainage network.
3. Clean sediment and trash off the grate.
4. Visually inspect the outside of the grate.
5. Remove the grate and visually inspect the inside of the catch basin to determine cleaning needs.
6. Inspect the catch basin for structural integrity.
7. Determine the most appropriate equipment and method for cleaning the basin:
  - a. Manually use a shovel to remove accumulated sediments.
  - b. Use a bucket loader to remove accumulated sediments.
  - c. Use a high pressure washer to clean any remaining material out of the catch basin while capturing the slurry with a vacuum.
  - d. If necessary, after the catch basin is cleaned, use the rodder of the vacuum truck to clean the downstream pipe and pull back sediment that might have entered it.
8. If contamination is suspected, chemical analysis will be required to determine if the materials comply with the Massachusetts Department of Environmental Protection (MassDEP) Hazardous Waste Regulations, 310 CMR 30.000 ([https://www.mass.gov/files/documents/2016/08/xl/310cmr30\\_7883\\_54357.pdf](https://www.mass.gov/files/documents/2016/08/xl/310cmr30_7883_54357.pdf)). The chemical analysis required will depend on suspected contaminants. Note the identification number of the catch basin on the sample label and note sample collection on the Catch Basin Inspection Form.

### Handling and Disposal of Catch Basin Cleanings

- Properly dispose of collected sediments and catch basin cleanings (solid material, such as leaves, sand, and twigs removed from stormwater collection systems during cleaning operations).
- 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.
- Screenings may need to be placed in a drying bed to allow water to evaporate before proper disposal. In this case, ensure that the screenings are managed properly to prevent pollution.
- Catch basin cleanings must be handled and disposed in accordance with compliance with the applicable MassDEP regulations, policies, and guidance (<https://www.mass.gov/files/documents/2018/03/09/catch-basins.pdf>).

### Documentation and Reporting

The following information should be documented and included in the municipality's annual report – use the catch basin inspection log provided in the attachments to document the information to include in the report (alternatively, obtain records of volume of debris removed to include in the report):

- Metrics and other information used to reach the determination that the established plan for cleaning and maintenance is optimal for the MS4 (include in the SWMP and first annual report)
- Any action taken in response to excessive sediment or debris loadings
- Total number of catch basins
- Number of catch basins inspected
- Number of catch basins cleaned
- Total volume or mass of material removed from catch basins.
- 

### Employee Training

- Employees who perform catch basin cleaning and inspection are trained once per year on these procedures and the proper operation of related equipment.
- Employees are also trained on stormwater pollution prevention, illicit discharge detection and elimination (IDDE) procedures, and spill and response procedures.
- If services are contracted, the contractor should be given a copy of this and any applicable SOPs to ensure compliance with MS4 regulations.

### Attachments

1. Catch Basin Inspection Form and Log
2. Catch Basin Inventory

### Related Standard Operating Procedures

- 1. SOP F.1: Street Sweeping



Town of Wenham  
Catch Basin Cleaning Inventory 2019

Date	CB ID (ft)	Depth Before (ft)	Depth After (ft)	Inv Depth (ft)	% full 2019	Comment
3/30/2019	CB-449	4.33	4.5	4.17	4.08%	
	CB-545	5.5	4.83	4.42	15.16%	
	CB-610	-	-	-	-	CNL
	CB-612	-	-	-	-	CNL
	CB-611	-	-	-	-	CNL
	CB-162	2.75	3.75	2.92	34.25%	
	CB-163	3	3.92	2.75	33.45%	
	CB-161	2.92	3.83	1.92	47.40%	
	CB-160	4.25	4.5	3.08	8.12%	
	CB-159	1.92	2.42	1.92	26.04%	
	CB-158	5.17	5.42	4.83	5.18%	
	CB-157	5	5.58	3.42	16.96%	
	CB-442	2.33	3.42	1.5	72.67%	
4/2/2019	CB-231	6	7.33	5	26.60%	
	CB-230	6	6.17	4	4.25%	
	CB-232	6.58	6.75	3	5.67%	
	CB-4	5.42	5.5	3.42	2.34%	
	CB-234	5	4.83	4.5	3.78%	
	CB-233	5.67	6.17	3.42	14.62%	
	CB-235	3.75	4.17	3.75	11.20%	
	CB-443	2.83	3.08	2.42	10.33%	
	CB-237	4.17	4.08	3.83	2.35%	
	CB-236	4	3.75	3.25	7.69%	
	CB-239	4.75	5.08	4.25	7.76%	
	CB-238	5	5.08	3.42	2.34%	
	CB-241	5.17	5.25	3.25	2.46%	
	CB-227	5	5.58	CNL	-	CNL
	CB-243	3.08	4.33	2.58	48.45%	
	CB-242	5.17	5.58	4.75	8.63%	
	CB-244	5.67	5.67	4.5	0.00%	
	CB-245	3	3.83	CNL	-	
	CB-246	3.17	4.08	CNL	-	
	CB-247	-	-	-	-	In Hamilton
	CB-248	-	-	-	-	In Hamilton
	CB-249	-	-	-	-	In Hamilton
	CB-564	-	6.67	N/A	-	No outlet
	CB-563	5	5.25	4.5	5.56%	
	CB-252	2.67	2.75	2.67	3.00%	
3/28/2019	CB-314	5.83	6.17	4.42	7.69%	
	CB-436	4.75	5.33	4	14.50%	Also CB 313
	CB-316	3.67	4.17	2.58	19.38%	
	CB-315	7.17	7.17	5.83	0.00%	
3/29/2019	CB-285	5.17	5.42	3.75	6.67%	
	CB-284	4	4.92	4	23.00%	
	CB-446	5.75	5.92	4.67	3.64%	
	CB-286	7.5	7.67	6	2.83%	
	CB-588	4.67	5.17	4.17	11.99%	
	CB-587	5	-	~ 5.0	-	Concrete top
	CB-322	9.75	9.17	8.67	6.69%	
	CB-308	5.17	5.17	4.17	0.00%	
	CB-307	4.58	4.83	4	6.25%	
	CB-589	2.75	2.67	2.6	3.08%	
	CB-305	5.42	5.58	4.42	3.62%	
	CB-306	6	6.17	5	3.40%	
	CB-323	5.42	5.92	3.25	15.38%	
	CB-324	2.5	2.75	1.17	21.37%	
	CB-326	4.25	4.25	3.83	0.00%	
	CB-325	4.75	5.17	3.83	10.97%	
	CB-621	1.92	2	1.92	4.17%	
	CB-327	2.58	2.75	1.58	10.76%	
	CB-328	5.67	5.67	4	0.00%	
	CB-330	4.17	5	3.33	24.92%	

Date	CB ID (ft)	Depth Before (ft)	Depth After (ft)	Inv Depth (ft)	% full 2019	Comment
	CB-329	4.33	4.5	3.25	5.23%	
	CB-332	6	6.25	4.83	5.18%	
	CB-331	5.08	5	5	1.60%	
	CB-334	5.17	5.17	4.25	0.00%	
	CB-333	5.83	6.33	4.92	10.16%	
	CB-336	3.92	3.92	3.92	0.00%	
	CB-335	4.67	4.5	4.75	3.58%	
	CB-338	4.08	4.17	3.83	2.35%	
	CB-337	5.42	6	5.25	11.05%	
	CB-340	4.58	5.5	4.25	21.65%	
	CB-339	6.58	6.83	5.5	4.55%	
	CB-448	3.33	4	3.42	19.59%	
	CB-427	-	2.08	-	-	Unable to located due to snow - revisit
	CB-426	4	4.58	3.25	17.85%	
	CB-280	2.16	2.25	2.08	4.33%	
	CB-279	3.75	4.67	3	30.67%	
3/30/2019	CB-438	6	6.33	4	8.25%	
	CB-171	4	4.17	2.17	7.83%	
	CB-172	2.42	4.5	2.58	80.62%	
	CB-173	3.17	3.75	2.17	26.73%	
	CB-174	5	5.33	5.17	6.38%	
	CB-439	3	3.33	2.58	12.79%	
	CB-176	4.5	5	4	12.50%	
	CB-175	6	6.08	6	1.33%	
	CB-178	4	4.58	3.33	17.42%	
	CB-177	4.17	4.58	3.5	11.71%	
	CB-180	4.58	5.25	4	16.75%	
	CB-179	5	5.58	4.17	13.91%	
	CB-440	3	4.17	2.67	43.82%	
	CB-441	5.08	5.17	4.25	2.12%	
	CB-182	3.42	4	3	19.33%	
	CB-181	4	4.5	3.5	14.29%	
	CB-184	4.42	4.58	3.75	4.27%	
	CB-183	4	4.42	3	14.00%	
	CB-619	4.58	-	4.58	-	MH
	CB-570	4.42	5.42	3.75	26.67%	
	CB-164	3.75	4.58	3.58	23.18%	
	CB-165	4.25	4.83	4.08	14.22%	
	CB-168	6.42	6.42	5.5	0.00%	
	CB-169	4.67	5	4	8.25%	
	CB-423	4.17	4.92	2.83	26.50%	
	CB-424	4.42	4.67	4.08	6.13%	
	CB-425	3.1	5	2.67	71.16%	
	CB-155	2.17	2.5	1.83	18.03%	
	CB-397	3.75	4.58	3.17	26.18%	
	CB-398	4.42	4.75	3.75	8.80%	
	CB-156	5.17	5.5	2.33	14.16%	
4/2/2019	CB-191	7.17	6.92	No outlet	-	Revisit to measure inlet
	CB-190	5.25	5.25	No outlet	-	Revisit to measure inlet
	CB-194	5.25	4.75	3.67	13.62%	
	CB-195	4	5.17	3	39.00%	
	CB-196	4.33	4.67	3	11.33%	
	CB-536	3	2	0.67	149.25%	
	CB-197	2	1.92	2	4.00%	
	CB-3	4.17	4.08	1.5	6.00%	
	CB-198	5	4.5	4	12.50%	
	CB-444	5.17	4.67	4	12.50%	
	CB-202	5.75	6.5	4.67	16.06%	
	CB-200	5.33	5.58	3.5	7.14%	
	CB-201	3.75	4.5	3.5	21.43%	
	CB-204	3.33	3.5	2.33	7.30%	
	CB-203	6.75	6.67	2.75	2.91%	
	CB-206	5.17	5.42	3.25	7.69%	
	CB-205	4.75	4.92	3.33	5.11%	

Date	CB ID (ft)	Depth Before (ft)	Depth After (ft)	Inv Depth (ft)	% full 2019	Comment
	CB-207	4.08	4.33	3.08	8.12%	
	CB-208	4.75	4.92	2.5	6.80%	
	CB-210	3.5	3.5	2.5	0.00%	
	CB-209	3.42	3.25	2.5	6.80%	
	CB-211	5	6	2.67	37.45%	
	CB-620	3.33	3.92	3	19.67%	
	CB-212	4.25	4.5	3	8.33%	
	CB-213	3.58	4.17	1.58	37.34%	
	CB-214	0.67	0.67	-	-	12" Sq CB
	CB-216	7.58	7.25	N/A	-	Revisit to measure inlet
	CB-215	1.33	1.17	CNL	-	
	CB-218	7	6.92	3.42	-2.34%	
	CB-217	8.67	8.58	N/A	-	Leach tank
	CB-219	7.58	7.75	7.5	2.27%	
	CB-220	5.75	6.75	5	20.00%	
	CB-223	9.17	9.5	9.5	3.47%	
	CB-221	5	5.17	CNL	-	CNL Invert
	CB-224	7.58	7.75	6	2.83%	
	CB-222	6.67	7.17	6	8.33%	
	CB-225	6.75	7.25	3.75	13.33%	
	CB-579	1.5	1.5	1.5	0.00%	
	CB-5	5.42	-	5.25	-	MH
	CB-226	6.17	6.17	2.75	0.00%	
	CB-227	5	5.58	CNL	-	
	CB-244	5.67	5.67	4.5	0.00%	CNL Invert
	CB-229	6.5	6.42	4.5	1.78%	
	CB-228	5.58	6	3	14.00%	
	CB-577	6.5	6.75	4.67	5.35%	
	CB-578	4.58	5.08	4.33	11.55%	
	CB-518	5.33	-	4.25	-	Revisit to determine sump depth
	CB-515	7.58	-	5	-	Revisit to determine sump depth
	CB-519	6.33	-	4.42	-	Revisit to determine sump depth
	CB-517	6.67	-	2.83	-	Revisit to determine sump depth
	CB-516	5.67	-	5.67	-	Revisit to determine sump depth
	CB-528	-	3.58	-	-	Revisit to determine sump depth
	CB-12	-	3.83	-	-	Revisit to determine sump depth
	CB-531	-	-	-	-	Revisit to determine sump depth
	CB-563	5	5.25	4.5	5.56%	
	CB-252	2.67	2.75	2.67	3.00%	
	CB-564	6.5	6.67	-	-	Leach tank
4/3/2019	CB-46	4	2.92	2.75	-39.27%	
	CB-45	2.83	2.83	2.75	0.00%	
3/28/2019	CB-313	3.42	3.83	2.75	14.91%	
	CB-435	5.42	6	4	14.50%	
	CB-370	3.83	-	3	-	Revisit to determine sump depth
	CB-319	3.67	-	3	-	Revisit to determine sump depth
	CB-320	4.67	-	4.83	-	Revisit to determine sump depth
	CB-318	5.33	-	4.83	-	Revisit to determine sump depth
	CB-317	5.75	-	5.33	-	Revisit to determine sump depth
	CB-572	5	-	3.75	-	Revisit to determine sump depth
	CB-400	4	-	3.92	-	Revisit to determine sump depth
	CB-401	3.75	-	3.58	-	Revisit to determine sump depth
	A	5.67	5.75	2.92	2.74%	Map 15
	C	2.75	3.42	2.08	32.21%	Map 15
	CB-399	5.5	5.92	2.5	16.80%	
	CB-1	5.42	5.08	3.75	9.07%	
	CB-281	4.08	-	3.33	-	Revisit to determine sump depth
	CB-282	4.58	5	2.5	16.80%	
	CB-543	4.25	4.58	3.42	9.65%	
	CB-609	4.33	5.25	2.83	32.51%	
	CB-542	2	2.25	1.83	13.66%	
	CB-447	5.5	5.83	3.83	8.62%	
	CB-341	4	3.92	3.25	2.46%	
	CB-342	3.42	3.33	3.25	2.77%	
	CB-343	3.5	3.33	3.17	5.36%	

Date	CB ID (ft)	Depth Before (ft)	Depth After (ft)	Inv Depth (ft)	% full 2019	Comment
	CB-344	3.17	3	3	5.67%	
	CB-590	4.92	-	4.58	-	Revisit to determine sump depth
	CB-283	5	6	4.75	21.05%	
	CB-591	6.5	-	5.92	-	Revisit to determine sump depth
	CB-321	2.17	2.67	1.92	26.04%	
	CB-302	3.17	4.67	3.08	48.70%	
	CB-437	5	5.17	4.42	3.85%	
	CB-303	3.5	4.25	3	25.00%	
	CB-304	4.08	4.5	3.5	12.00%	
	CB-301	4.67	5.17	4.25	11.76%	
	CB-300	3.83	4.67	3.33	25.23%	
	CB-299	4.67	5.17	4.08	12.25%	
	CB-298	5.58	6	3.75	11.20%	
	CB-297	6.08	6.25	4	4.25%	
	CB-296	4.92	4.92	4.92	0.00%	
	CB-372	5.83	5.58	4.67	5.35%	
	CB-293	5.08	5.33	4.67	5.35%	
	CB-371	5	5.67	4.25	15.76%	
	CB-292	4.25	5	4.25	17.65%	
	CB-295	5.58	5.92	3.33	10.21%	
	CB-294	5.17	5.75	4.17	13.91%	
	CB-373	5.42	6.08	4.83	13.66%	
	CB-374	5.42	6.25	4.92	16.87%	
	CB-313	3.42	3.83	2.75	14.91%	
	CB-312	4.67	5.25	4	14.50%	
	CB-311	4.33	4.75	3.17	13.25%	
	CB-309	4.33	4.58	4	6.25%	
	CB-310	4.33	4.83	3.75	13.33%	
3/30/2019	CB-172	2.42	4.5	2.58	80.62%	
	CB-173	3.17	3.25	2.16	3.70%	
	CB-571	4.25	5.08	2.92	28.42%	
	CB-171	4	4.17	2.17	7.83%	
	CB-167	4.75	5.17	1.83	22.95%	
	CB-170	3.33	3.67	1	34.00%	
	CB-574	5.25	5.67	2.33	18.03%	
	CB-166	3.83	4.5	1.67	40.12%	
	CB-185	3.83	4	4	4.25%	
	CB-186	1.67	3.83	2	108.00%	
	CB-189	4.83	5.58	2.33	32.19%	
	CB-187	4.5	5.58	4.25	25.41%	
	CB-576	2.17	3.17	2.25	44.44%	
	CB-188	3.5	4.42	4	23.00%	
	CB-268	4.25	5	2.33	32.19%	
	CB-269	4.67	5.08	3.17	12.93%	
	CB-275	5.5	6.08	4.33	13.39%	
	CB-273	4.42	5	3.5	16.57%	
	CB-274	5.08	5.58	3.33	15.02%	
	CB-271	5	6.42	4	35.50%	
	CB-272	3.67	4.83	3.67	31.61%	
	CB-278	5.17	5.08	4.83	1.86%	
	CB-270	4.83	5.5	3.25	20.62%	
	CB-276	4.17	4.5	1.92	17.19%	
	CB-277	5.75	6.33	5.33	10.88%	
	CB-276	4.17	4.5	1.92	17.19%	
	CB-277	5.75	6.33	5.33	10.88%	
	CB-	1.83	2	1.92	8.85%	Map 16 - no on map
	CB-267	4	4.92	2.67	34.46%	
	CB-266	2.75	3.25	2.75	18.18%	
	CB-434	5.75	5.33	3.17	13.25%	
	CB-264	2.92	3.67	2.67	28.09%	
	CB-265	5	-	3.75	-	Revisit to determine sump depth
	CB-262	2.17	2.25	2.17	3.69%	
	CB-263	4.92	4.92	4.08	0.00%	
	CB-260	5.17	5.42	3.75	6.67%	
	CB-261	6.25	6.17	4.5	1.78%	

Date	CB ID (ft)	Depth Before (ft)	Depth After (ft)	Inv Depth (ft)	% full 2019	Comment
	CB-581	5	-	3.17	-	Revisit to determine sump depth
	CB-259	3.75	4	3.67	6.81%	
	CB-277	6	6.33	5.33	6.19%	
	CB-278	5.17	5.08	4.67	1.93%	
	B	4.5	4.83	2.58	12.79%	Map 16
	CB-164	3.75	4.58	3.58	23.18%	
	CB-165	4.25	4.83	4.08	14.22%	
	CB-168	6.42	6.42	5.5	0.00%	
	CB-169	4.67	5	4	8.25%	
	CB-573	2.25	4	2.25	77.78%	
	CB-445	2	2	2	0.00%	
4/1/2019	CB-502	4.92	-	4.83	-	Revisit to determine sump depth
	CB-501	4.92	-	4.67	-	Revisit to determine sump depth
	CB-503	5.92	-	4.83	-	Revisit to determine sump depth
	CB-504	5.17	-	4.83	-	Revisit to determine sump depth
	CB-500	5.08	-	5.08	-	Revisit to determine sump depth
	CB-498	5.25	-	5.25	-	Also CB 499
	CB-496	4.33	-	4	-	Revisit to determine sump depth
	CB-497	4.17	-	4.17	-	Revisit to determine sump depth
	CB-626	5	5.17	4	4.25%	
	CB-580	4.83	5.25	3.83	10.97%	
	CB-490	4.92	-	4.33	-	Revisit to determine sump depth
	CB-492	6	-	4.17	-	Revisit to determine sump depth
	CB-491	5.5	-	3.5	-	Revisit to determine sump depth
	CB-6	-	-	-	-	CNL
	CB-495	4	-	3.42	-	Revisit to determine sump depth
	CB-511	3.75	-	3.83	-	Revisit to determine sump depth
	CB-509	5.58	-	4.17	-	Revisit to determine sump depth
	CB-508	2	-	2.33	-	Revisit to determine sump depth
	CB-507	5.75	-	4.08	-	Revisit to determine sump depth
	CB-522	4.92	-	4.42	-	Revisit to determine sump depth
	CB-512	6.17	-	5.58	-	Revisit to determine sump depth
	CB-193	4	6	2.92	68.49%	
	CB-192	2.83	3.67	2.83	29.68%	
	CB-422	4.83	5.17	4.5	7.56%	
	CB-421	4.25	4.33	1.42	5.63%	
	CB-288	4.58	5.25	2.17	30.88%	
	CB-287	9.33	9.83	CNL	-	CNL Invert
	CB-289	4.67	4.5	3.75	4.53%	
	CB-470	3.42	3.42	3.42	0.00%	
	CB-290	2.92	2.83	2.33	3.86%	
	CB-513	8.5	-	6.67	-	Revisit to determine sump depth
	CB-521	5.17	-	3.5	-	Revisit to determine sump depth
	CB-505	6.17	-	3.08	-	Revisit to determine sump depth
	CB-575	3.17	-	2.5	-	Revisit to determine sump depth
	PD	6	-	-	-	Map 18 - not on map
	CB-569	2.67	-	2.58	-	Revisit to determine sump depth
	A	-	-	-	-	Map 18 - not on map
	CB-506	7	-	3.83	-	Revisit to determine sump depth
	B	6	-	3.75	-	Map 18 - not on map
	D	-	-	-	-	Map 18 - not on map
	C	5.42	-	3.67	-	Map 18 - not on map
	E	6.5	-	4.42	-	Map 18 - not on map
	F	6.33	-	4.83	-	Map 18 - not on map
	CB-523	5.17	-	3.75	-	Revisit to determine sump depth
	CB-520	5.33	-	3.25	-	Revisit to determine sump depth
	CB-514	3.25	-	3.25	-	Revisit to determine sump depth
	CB-A	2.25	2.25	CNL	-	Map 18 - not on map
4/2/2019	CB-39	5.42	5.92	3.67	13.62%	
	CB-40	6.5	6.33	3.83	4.44%	
	CB-562	4.83	5.25	2	21.00%	
	CB-70	4	4.17	3.58	4.75%	
	CB-615	6.42	6.33	6.42	1.40%	
4/3/2019	CB-55	5.17	6.08	4.17	21.82%	
	CB-47	3.17	3.92	2.5	30.00%	

Date	CB ID (ft)	Depth Before (ft)	Depth After (ft)	Inv Depth (ft)	% full 2019	Comment
	CB-561	3.33	-	3.33	-	Revisit to determine sump depth
	CB-54	5.75	5.5	4.42	5.66%	
	CB-63	4.25	4.33	3.83	2.09%	
	CB-549	4.33	4.58	4	6.25%	
	CB-62	2.92	2.5	2.17	19.35%	
	CB-553	2.67	3.5	2.25	36.89%	
	CB-58	6.17	6.17	4.25	0.00%	
	CB-49	3.42	3.83	2.5	16.40%	
	CB-52	4.92	5.42	4.17	11.99%	
	CB-555	3.83	4.33	3.67	13.62%	
	CB-48	3.58	4.67	2.17	50.23%	
	CB-554	2.67	4.17	2.5	60.00%	
	CB-50	3.92	4.42	2.25	22.22%	
	CB-556	2.42	2.08	2	17.00%	
	CB-560	6.75	7.17	5.75	7.30%	
	CB-53	6.58	7	5.33	7.88%	
	CB-617	-	-	-	-	CNL
	CB-561	3.33	-	3.33	-	Revisit to determine sump depth
3/28/2019	A	4	4.42	-	-	Map 24 - not on map
	CB-346	4.33	4.92	1.92	30.73%	
	CB-345	4	4.67	4.25	15.76%	
	CB-348	4.67	4.83	3.92	4.08%	
	CB-347	4.42	4.5	3.83	2.09%	
	CB-350	7	7	7.08	0.00%	
	CB-349	6.58	6.58	6.58	0.00%	
	CB-351	6.67	6.75	6.33	1.26%	
	CB-2	6.33	6.5	6.33	2.69%	
	CB-352	4.17	4.25	3.67	2.18%	
	CB-353	4	4.25	1.67	14.97%	
	CB-7	5.58	-	5.25	-	Revisit to determine sump depth
	CB-354	2.67	3.33	1.25	52.80%	
	CB-355	3.83	3.83	1.25	0.00%	
	CB-356	4.5	4.83	2.25	14.67%	
	CB-357	4	4.33	3	11.00%	
	CB-358	3.83	4.25	2.33	18.03%	
	CB-359	6	6.08	4	2.00%	
	CB-361	4.42	5	2.33	24.89%	
	CB-364	5.75	6	3.75	6.67%	
	CB-362	5.92	6.08	3.42	4.68%	
	CB-365	6	6.42	4.25	9.88%	
	CB-366	5.67	6.08	4.58	8.95%	
	CB-367	6	6.25	4.75	5.26%	
	CB-368	5.67	5.58	3.83	2.35%	
	CB-369	5.33	5.42	3.5	2.57%	
3/29/2019	CB-395	5.67	5.92	4.92	5.08%	
	CB-396	6	6.58	4.42	13.12%	
	CB-412	6.83	6.92	5	1.80%	
	CB-413	5.58	6.08	4	12.50%	
	CB-255	6	6.17	4	4.25%	
	CB-256	5.83	6.33	4.33	11.55%	
	CB-257	4.33	5.25	4.33	21.25%	
	CB-258	5	5.75	4.25	17.65%	
	CB-253	4.5	5.17	4.08	16.42%	
	CB-254	5	5.42	4.17	10.07%	
	CB-403	5	5.5	4.5	11.11%	
	CB-428	4.67	5.17	3.17	15.77%	
	CB-404a	6.25	6.25	5.25	0.00%	
	CB-404b	4.58	5	3.33	12.61%	
	CB-409	5.67	6	4	8.25%	
	CB-584	5	5.25	2.67	9.36%	
	CB-582	6	6.42	3.33	12.61%	
	CB-583	5	5.08	3	2.67%	
	CB-407	4.42	5.42	3.58	27.93%	
	CB-408	6	6.33	5.83	5.66%	
	CB-406	5.67	5.92	4.83	5.18%	

Date	CB ID (ft)	Depth Before (ft)	Depth After (ft)	Inv Depth (ft)	% full 2019	Comment
	CB-405	3	4.75	3	58.33%	
	CB-377	4.67	5.08	3.75	10.93%	
	CB-378	4.17	4.75	3.42	16.96%	
	CB-375	6.67	6.58	4.42	2.04%	
	CB-376	3.67	4.5	3	27.67%	
	CB-414	5.33	5.5	4.17	4.08%	
	CB-394	5.5	6.33	4.17	19.90%	
	CB-291	4.25	5	3.17	23.66%	
4/1/2019	CB-402	2.25	2.17	2.25	3.56%	
	CB-472	4.17	5	4.17	19.90%	
	CB-473	5.25	5.5	3.83	6.53%	
	CB-566	-	-	-	-	CNL
	CB-471	4.67	5.08	3.67	11.17%	
	CB-566	-	-	-	-	CNL
	CB-471	4.67	4.08	3.67	16.08%	
	CB-475	2.17	2.58	1.58	25.95%	
	CB-474	2.25	2.58	-	-	CNL Outlet
	CB-487	4.5	4.17	3.25	10.15%	
	CB-484	5	5.25	4.67	5.35%	
	CB-488	4.83	5.25	3.58	11.73%	
	CB-485	4.5	4.92	4.25	9.88%	
	CB-486	4.17	4.5	3.25	10.15%	
	CB-483	4.67	5.17	4.25	11.76%	
	CB-481	5.42	5.42	4.83	0.00%	
	CB-482	6	5.83	4.33	3.93%	
	CB-1	2.67	-	2.67	-	Revisit to determine sump depth
	CB-480	2	-	1.75	-	Revisit to determine sump depth
	CB-539	6.83	-	6.83	-	Revisit to determine sump depth
	CB-476	4	-	3.67	-	Revisit to determine sump depth
	CB-477	4	-	3.75	-	Revisit to determine sump depth
	CB-478	1.42	-	1.5	-	Revisit to determine sump depth
	CB-479	1.83	-	1.83	-	Revisit to determine sump depth
	CB-493	5.67	-	4.58	-	Revisit to determine sump depth
	CB-489	5	-	5	-	Revisit to determine sump depth
	CB-494	6.42	-	4.42	-	Revisit to determine sump depth
	CB-494b	5.25	-	4.25	-	Revisit to determine sump depth
	CB-462	3.5	-	3.17	-	Revisit to determine sump depth
	CB-464	4.17	-	3	-	Revisit to determine sump depth
	CB-465	4	-	2.83	-	Revisit to determine sump depth
	CB-1A	4.17	-	2.67	-	Map 28 - not shown on map
	CB-466	2.17	-	-	-	Revisit to determine sump depth
	CB-467	4.25	-	-	-	CNL Outlet
4/5/2019	A	3	3.42	2	21.00%	Map 30 - not shown on map
4/3/2019	CB-549	4.33	4.58	4	6.25%	
	CB-546	3.5	4.17	3.08	21.75%	
	CB-544	4.75	5	3.33	7.51%	
	CB-567	3.58	3.5	2.33	3.43%	
	CB-568	5.25	5.83	3.67	15.80%	
	CB-557	5	5.08	3.17	2.52%	
	CB-59	5	5.17	3.33	5.11%	
	CB-64	4.42	4.58	2.75	5.82%	
	CB-65	3.33	3.5	2.25	7.56%	
	CB-66	2	2.58	CNL	-	CNL Invert
	CB-67	2	3.33	2	66.50%	
	CB-68	5.17	5.42	4.75	5.26%	
	CB-552	-	-	-	-	CNL
	CB-103	2.83	2.58	1.75	14.29%	
	CB-69	3.08	4	3.08	29.87%	
	CB-606	6.08	5.83	3.33	7.51%	
	CB-607	5.58	5.17	5.25	7.81%	
	CB-608	6	5.5	4.75	10.53%	
	CB-103A	-	6.17	-	-	Revisit to determine sump depth
	CB-605	7.33	7.33	3.33	0.00%	
	CB-606	6.08	5.83	3.33	7.51%	
	CB-29	5.67	4.92	3	25.00%	

Date	CB ID (ft)	Depth Before (ft)	Depth After (ft)	Inv Depth (ft)	% full 2019	Comment
	CB-547	2.92	2.83	2.25	4.00%	
	CB-551	6	6.25	4.08	6.13%	
	CB-26	5.58	5.92	4.5	7.56%	
	CB-540	5	5	2.67	0.00%	
	CB-27	3.67	4.58	2.75	33.09%	
	CB-28	4.42	5	2.42	23.97%	
	CB-8	5.08	4.83	2.92	8.56%	
	CB-9	5.08	4.58	2.75	18.18%	
	CB-10	5.17	4.83	4.17	8.15%	
	CB-11	5.83	5.5	3.83	8.62%	
	CB-25	6.25	5.58	4.25	15.76%	
	CB-24	6	6	4.58	0.00%	
	CB-20	5.92	5.33	4.33	13.63%	
	CB-21	5.92	5.67	3.75	6.67%	
	CB-22	5.33	5	4.58	7.21%	
	CB-23	6.08	5.58	4.08	12.25%	
3/28/2019	CB-395	5.67	5.92	4.92	5.08%	
	CB-396	6	6.58	4.42	13.12%	
	CB-415	6.17	6	5.75	2.96%	
	CB-416	4.58	4.58	4.25	0.00%	
	CB-417	5.83	5.75	4.17	1.92%	
	CB-432	6	6.12	4.75	2.53%	
	CB-417	5.83	5.75	4.17	1.92%	
	CB-432	6	6.17	4.75	3.58%	
	CB-418	5.42	5.42	3.92	0.00%	
	CB-431	4.67	4.83	3.25	4.92%	
	CB-430	6	6	4.17	0.00%	
	CB-419	5.17	5.67	4.67	10.71%	
	CB-420	7.67	7.58	7	1.29%	
	CB-391	5.83	6.17	3.67	9.26%	
	CB-390	7	7.5	6.33	7.90%	
	CB-389	6.17	6.42	4.17	6.00%	
	CB-388	5.83	6.08	4	6.25%	
	CB-585	-	-	-	-	CNL
	CB-387	5.33	5.42	3.83	2.35%	
	CB-386	6.5	6.67	4.42	3.85%	
	CB-385	1.25	1.5	1.25	20.00%	
	CB-384	4.58	5.25	1.58	42.41%	
	CB-383	5.08	5.42	2.25	15.11%	
	CB-382	5.92	6.33	2	20.50%	
	CB-380	5.25	6	3.17	23.66%	
	CB-381	4.75	4.75	1.58	0.00%	
	CB-429	4	4.08	3.5	2.29%	
	CB-379	6.67	6.67	3.08	0.00%	
	CB-433	9.5	9.58	7.33	1.09%	
	CB-586	4.17	4.42	2.83	8.83%	
	CB-392	3.25	3.5	3.08	8.12%	
	CB-393	7.33	7.33	4.5	0.00%	
	CB-22	4.83	5.33	3.33	15.02%	
	CB-23	5.83	5.83	3.5	0.00%	
3/29/2019	CB-602	7	7	7	0.00%	
	CB-599	5.25	5.75	4.25	11.76%	
	CB-600	2.92	4.08	2.83	40.99%	
	CB-601	4.33	4.92	4.17	14.15%	
	CB-598	4	5.42	4	35.50%	
	CB-597	5.42	5.92	2.83	17.67%	
4/1/2019	CB-456	4.17	-	4.17	-	?
	CB-457	4.17	-	4.17	-	?
	CB-455	5.5	5.42	4	2.00%	
	CB-451	4.25	4.75	3.83	13.05%	
	CB-450	4.42	4.92	3.75	13.33%	
	CB-454	5.42	5.5	3.83	2.09%	
	CB-460	5.17	-	3.33	-	Revisit to determine sump depth
	CB-461	4.75	-	4.17	-	Revisit to determine sump depth
	1A	5	-	3	-	Map 38-not on map

Date	CB ID (ft)	Depth Before (ft)	Depth After (ft)	Inv Depth (ft)	% full 2019	Comment
	CB-459	4	-	4	-	Revisit to determine sump depth
	CB-458	4.33	-	4	-	Revisit to determine sump depth
	CB-453	5.42	6.17	-	-	Revisit to determine sump depth
	CB-452	4	4.92	-	-	Revisit to determine sump depth
	CB-469	5.33	5.58	3.08	8.12%	
	CB-468	4.08	4.25	3.33	5.11%	
	CB-51	-	-	-	-	In Beverly
4/3/2019	CB-559	3.25	4.08	2.25	36.89%	
	CB-61	-	-	-	-	In Beverly
	CB-603	2.75	2.83	2.5	3.20%	
	CB-60	-	-	-	-	CNL
	CB-558	5.58	6	4.25	9.88%	
	CB-604	3.33	3.33	3.33	0.00%	
4/4/2019	CB-104	7.33	7.33	3.58	0.00%	
	CB-12	6	4.5	3.92	38.27%	
	CB-13	4.92	5.83	3.58	25.42%	
	CB-16	5.67	5.25	4.25	9.88%	
	CB-17	4.58	4.5	2.92	2.74%	
	CB-14	6.08	5.83	4.17	6.00%	
	CB-15	6.17	5.58	4.33	13.63%	
	CB-613	5.83	5.5	4.58	7.21%	
	CB-18	5.83	5.5	4.58	7.21%	
	CB-614	5.33	5.83	3.67	13.62%	
	CB-19	5.33	5.83	3.67	13.62%	
	CB-73	5.92	5.83	3.08	2.92%	
	CB-71	4.25	4.08	-	-	Revisit to determine invert
	A	4.5	5.75	3.5	35.71%	Map 44- not on map
	CB-72	3.25	3.08	3.25	5.23%	
	CB-76	6.75	6.33	2.58	16.28%	
	CB-75	5	5.58	3.83	15.14%	
	B	5.67	5.58	-	-	Revisit to determine invert
	CB-74	3.17	2.83	2.75	-12.36%	
	CB-593	-	-	-	-	Gordon College
	CB-594	-	-	-	-	Gordon College
	CB-595	-	-	-	-	Gordon College
	CB-91	5.75	5.5	4.08	6.13%	
	CB-90	5.67	5.5	4.08	4.17%	
	CB-87	6.42	6.42	5.33	0.00%	
	CB-92	3.75	2.58	2.67	43.82%	
	CB-88	4.42	4.42	4.42	0.00%	
	CB-89	5.92	6	4.08	1.96%	
	CB-86	4.33	4.83	3.92	12.76%	
	CB-101	-	-	-	-	On overpass
	CB-102	-	-	-	-	On overpass
	CB-99	-	-	-	-	On overpass
	CB-100	-	-	-	-	On overpass
	CB-97	-	-	-	-	On overpass
	CB-98	-	-	-	-	On overpass
	CB-143	5.5	5.67	4.08	4.17%	
	CB-105	6.17	6.42	4.25	5.88%	
	CB-81	5	5.42	3.42	12.28%	
	CB-82	3.25	3.58	3	11.00%	
	CB-83	3.92	4.42	2.17	23.04%	
	A	2.83	2.58	2.67	9.36%	Map 47 - not on map
	B	4.83	4.92	2.92	3.08%	
	CB-84	5.17	5.58	4.17	9.83%	
	CB-85	4.75	5.33	3.92	14.80%	
	CB-86	4.33	4.83	3.92	12.76%	
	CB-88	4.42	4.42	4.42	0.00%	
	CB-89	5.92	6	4.17	1.92%	
	CB-93	5.25	5.08	4.25	4.00%	
	CB-94	5.75	5.5	3.92	6.38%	
	CB-91	5.75	5.5	4.08	6.13%	
	CB-90	5.67	5.5	4.08	4.17%	
	CB-78	5.17	5.83	4.92	13.41%	

Date	CB ID (ft)	Depth Before (ft)	Depth After (ft)	Inv Depth (ft)	% full 2019	Comment
	CB-77	4.25	4.17	2.08	3.85%	
	CB-80	6.58	6.75	5.67	3.00%	
	CB-79	5.83	5.67	5.08	3.15%	
	CB-95	-	-	-	-	State CB
	CB-96	-	-	-	-	State CB
	CB-116	5.25	5.83	4.58	12.66%	
	CB-117	6	6.33	4.42	7.47%	
	CB-107	6.33	6.5	4.5	3.78%	
	CB-108	5.67	-	4.58	-	Revisit to determine sump depth
	CB-109	5.67	6.17	4.58	10.92%	
	CB-118	5	5	4	0.00%	
	CB-122	5.75	6.08	4	8.25%	
	CB-124	5.5	6.17	4	16.75%	
	CB-123	6.17	6.5	4.25	7.76%	
	CB-126	5.83	6.25	4.33	9.70%	
	CB-125	4.5	4.58	3.83	2.09%	
	CB-128	4.42	5.17	3.67	20.44%	
	CB-129	4.42	5.17	3.67	20.44%	
	CB-127	5.67	5.75	3.33	2.40%	
	CB-113	4.25	5.17	3.92	23.47%	
	CB-114	4.25	-	3.92	-	Revisit to determine sump depth
	CB-110	6.75	7.83	5.08	21.26%	
	CB-111	6.17	6.25	4.75	1.68%	
	CB-115	5.67	5.92	4.92	5.08%	
	CB-119	5.75	5.42	4.42	7.47%	
	CB-121	6	6.17	4.08	4.17%	
	CB-132	5.33	5.92	4.17	14.15%	
	CB-133	4.5	5.5	4	25.00%	
	CB-131	5.17	5.42	3.75	6.67%	
	CB-130	5.42	5.75	3.25	10.15%	
	A	5.42	5.58	4.67	3.43%	Map 48 - not on map
	B	5.42	5.58	4.67	3.43%	Map 48 - not on map
	CB-134	4.75	4.92	3.5	4.86%	
	CB-135	5.42	5.58	3.42	4.68%	
	CB-136	6.17	6.5	4	8.25%	
	CB-137	7.17	7	4.42	3.85%	
	CB-138	5.58	5.92	4	8.50%	
	CB-139	6.67	6.92	4.75	5.26%	
	CB-142	6	6	4	0.00%	
	C	6	6.17	4	4.25%	
	CB-140	5	5.25	3	8.33%	
	CB-141	7	7.08	5.42	1.48%	
	CB-150	5.68	5.75	2.75	2.55%	
	CB-151	5.67	6.08	2.5	16.40%	
	CB-592	-	-	-	-	State basin
	CB-152	-	-	-	-	State basin
	CB-153	-	-	-	-	State basin
	CB-101	-	-	-	-	State basin
	CB-100	-	-	-	-	State basin
	CB-102	-	-	-	-	State basin
	CB-541	1.5	2.5	1	100.00%	
	CB-154	1.17	2.5	1.17	113.68%	
	CB-151	5.67	6.08	2.5	16.40%	

## APPENDIX F

### Standard Operating Procedures – Street Sweeping

#### F.1: Street Sweeping

**Standard Operating Procedures**  
*Wenham, MA*  
*Highway Department*  
**Sweeping Streets and Parking Lots**

**Issue Date:**

**Approved by:**

\_\_\_\_\_ Bill Tyack \_\_\_\_\_  
*Public Works Director (or similar)*

**Purpose of SOPs:**

Procedures for the operation and maintenance of street sweepers, frequency of sweeping, disposal of debris, and recordkeeping to maintain clean and safe roadways all while preventing pollution from entering the stormwater sewer systems. Pollutants like sand, trash and leaves can enter the storm sewer and have a negative impact on the receiving water body.

**MA Small MS4 General Permit Requirement Summary:**

**Part 2.3.7.a.iii.3.**

The permittee shall establish and implement procedures for sweeping and/or cleaning streets, and permittee-owned parking lots. All streets with the exception high speed limited access highways shall be swept and/or cleaned a minimum of once per year. The procedures shall also include more frequent sweeping of targeted areas determined by the permittee on the basis of pollutant load reduction potential, based on inspections, pollutant loads, catch basin cleaning or inspection results, land use, water quality limited or TMDL waters or other relevant factors as determined by the permittee. The permittee shall report in each annual report the number of miles cleaned or the volume or mass of material removed.

For limited access highways, the permittee shall either meet the minimum frequencies above, or develop and implement an inspection, documentation and targeted sweeping plan with two (2) years of the effective date of the permit, and submit such plan with its year one annual report.

**Part 2.3.a.iii.4.**

The permittee shall ensure proper storage of catch basin cleanings and street sweepings prior to disposal or reuse such that they do not discharge to receiving waters.

**Equipment Inventory:**

The following is a list of street sweeping equipment:

Equipment Number	Make	Description	Sweeper Speed (or other notes)
N/A		Street Sweeping is Contracted	

**Standard Operating Procedures**  
*Wenham, MA*  
*Highway Department*  
**Sweeping Streets and Parking Lots**

**Issue Date:**

**Operations**

1. Operate all sweepers and equipment according to the manufacturer's recommended settings, standards, and procedures.
2. While sweeping, drive between the optimal sweeping speed limit, as recorded in the equipment list above.
3. Sweeping will not take place during moderate to heavy rainfall or during periods of extreme cold (temperatures lower than 15 degrees Fahrenheit).
4. If spills occur or illegal discharges are seen, report to \_\_\_\_ DPW \_\_\_\_ (staff) Director of Public Works at \_\_\_\_ 978-468-5520 EXT. 6 \_\_\_\_ (phone)

**Maintenance**

1. Sweepers will be checked for leaks after each use. If a leak is discovered, it will immediately be contained and properly cleaned up.
2. Regular preventative maintenance to prolong equipment use (such as greasing moving parts and minor adjustments) occur once per month.
3. Parts are replaced when necessary. Brushes shall be replaced in accordance with manufacturer specifications.
4. Equipment is washed at the Wenham Highway Department at 91 Grape Vine Road, Wenham, MA 01984 to trap grease, oils and sediment

**Schedule**

1. Street sweeping will primarily take place between the months of March and June.
2. All streets with curbing and/or catch basins and municipal parking lots shall be swept a minimum of once per year in the spring between March and June (following winter activities such as sanding). Streets are swept according to the street list and schedule located at the DPW Facility and attached to this SOP as **Attachment 1**.
3. These roads/parking lots may be grouped by road category as long as the town's list of streets and parking lots also indicates the applicable road category (e.g. main arterials, residential areas, commercial areas, downtown areas, municipal parking lots, industrial areas, etc.).
4. Roads/Parking lots that have catch basins that are more than 50% full of sediment during two consecutive cleanings, shall be swept more to reduce sediment entering the basins.
5. The sweeping schedule is assessed once per year and updated as necessary.
6. A map of town roads and parking lots is in the DPW facility and is **Attachment 2** of this SOP.
7. If any event/activity such as fairs, construction, firefighting activities produce an excess amount of debris on the roadway or parking lot it should be swept as soon as practicable.

**Standard Operating Procedures**  
*Wenham, MA*  
*Highway Department*  
**Sweeping Streets and Parking Lots**

**Issue Date:**

**Storage and Disposal**

1. Solid sweeping debris is brought immediately to the \_\_\_\_ Highway Dept. gravel pit \_\_\_\_\_ (Location) for permanent disposal.

**Training**

1. Employees are trained once per year on this procedure and the proper operation of equipment. Employees are also trained on stormwater pollution prevention, spill and response, and illicit discharge detection and elimination procedures.

**Record Keeping**

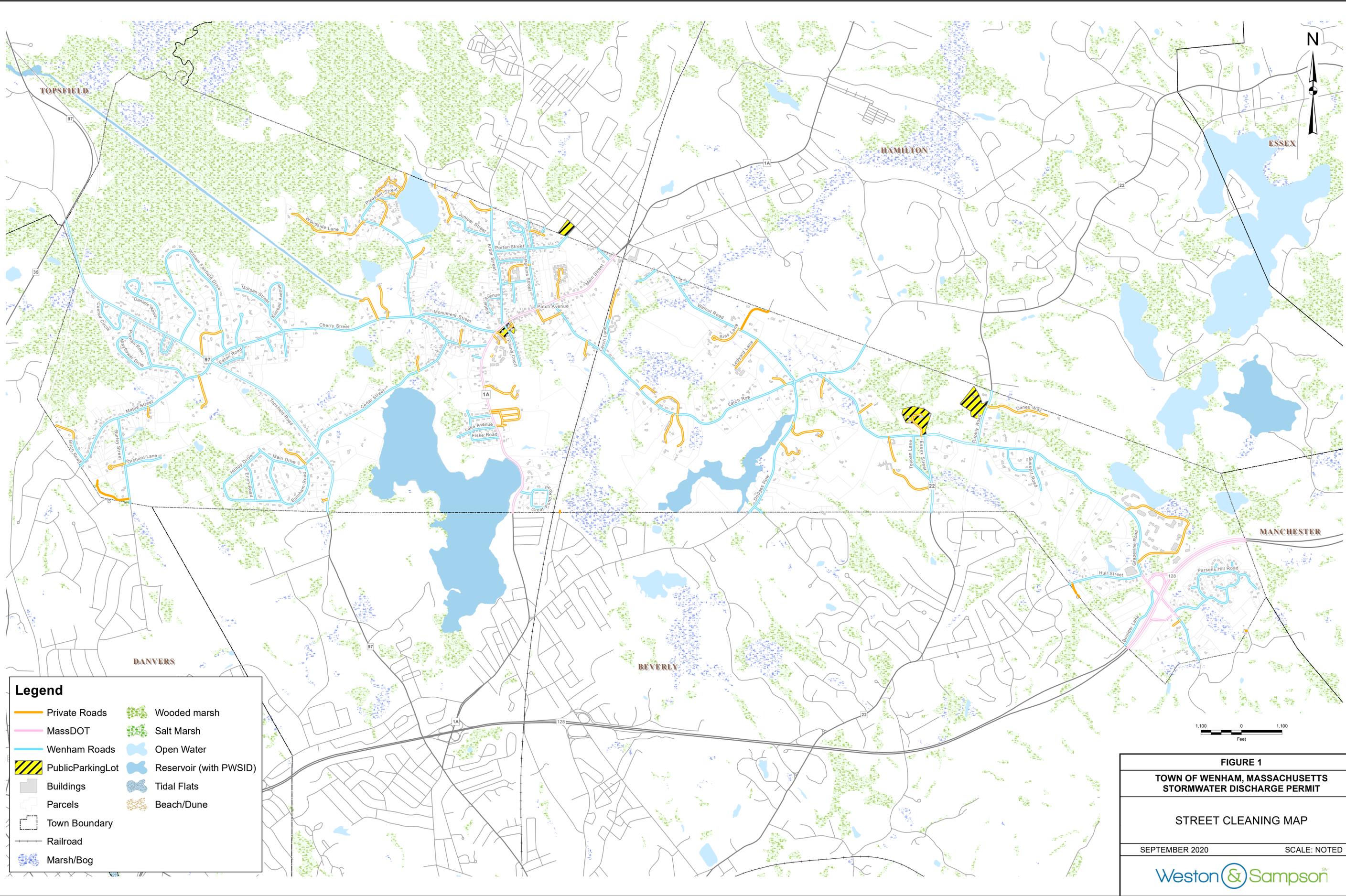
1. Records are kept at the DPW Facility located at \_\_\_\_ 91 Grapevine Rd. \_\_\_\_\_ (Location).
2. The number of miles swept is recorded after each sweeping. The amount of debris collected is recorded after each disposal.
3. The number of curb miles swept per year is calculated annually and included in the Town's Annual Report to the EPA.

**Revising the SOPs**

1. These procedures are reviewed once per year and updated as needed.

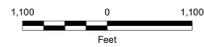
**Wenham, MA - Public Roads Inventory**

Street Name
ARBOR STREET
BIRCH ROAD
BOULDER LANE
BRUCE LANE
BURLEY STREET
BURNHAM ROAD
CEDAR STREET
CHARLES DAVIS DRIVE
CHERRY STREET
CHESTNUT STREET
CONRAD CIRCLE
DAMBROSIO WAY
DANIELS ROAD
DEXTER LANE
DODGES ROW
EATON ROAD
EDDEL AVENUE
ELLIS AVENUE
ENON ROAD
ESSEX STREET
FAIRVIEW AVENUE
FISKE ROAD
FOSTER STREET
FRIEND COURT
GRAPEVINE ROAD
GREAT POND ROAD
GROVER STREET
GUSSETT ROAD
HILLTOP DRIVE
HOWARD STREET
HULL STREET
JUNIPER STREET
KIMBALL AVENUE
LAFAYETTE LANE
LAKE AVENUE
LARCH LANE
LARCH ROW
LINDEN STREET
LOIS STREET
MAIN DRIVE
MAPLE STREET
MAYFLOWER DRIVE
MERIDIAN ROAD
MONUMENT STREET
MORGAN STREET
ONION RIVER ROAD
ORCHARD LANE
PARSONS HILL ROAD
PATTI LANE
PERKINS STREET
PLEASANT STREET
PORTER STREET
PRINCEMERE LANE
PUMP HOUSE ROAD
PURITAN ROAD
REGWILL AVENUE
RUBBLY ROAD
SCHOOL STREET
SPEAKERS LANE
STAGE HILL ROAD
STOCKWELL LANE
TOPPAN LANE
TOPSFIELD ROAD
VIRGINIA PLACE
WALNUT LANE
WALNUT ROAD
WILLIAM FAIRFIELD DRIVE



**Legend**

Private Roads	Wooded marsh
MassDOT	Salt Marsh
Wenham Roads	Open Water
PublicParkingLot	Reservoir (with PWSID)
Buildings	Tidal Flats
Parcels	Beach/Dune
Town Boundary	
Railroad	
Marsh/Bog	



**FIGURE 1**  
**TOWN OF WENHAM, MASSACHUSETTS**  
**STORMWATER DISCHARGE PERMIT**

**STREET CLEANING MAP**

SEPTEMBER 2020 SCALE: NOTED

File Path: \\server\GIS\Projects\2020\Stormwater\Map\_Series\Map\_Series.aprx  
 Project: \\server\GIS\Projects\2020\Stormwater\Map\_Series\Map\_Series.aprx  
 Date: 9/15/2020 10:00:00 AM  
 User: jsmith

## APPENDIX G

### Standard Operating Procedures – Inspection and Maintenance of Stormwater Treatment Structures

#### G.1: Inspection and Maintenance of Structural Stormwater Best Management Practices (BMPs)

# G.1: Inspection and Maintenance of Structural Stormwater Best Management Practices (BMPs)

## Introduction

Best Management Practices (BMPs) are policies, procedures and structures designed to reduce stormwater pollution, prevent contaminant discharges to natural water bodies, and reduce stormwater facility maintenance costs. Structural BMPs are permanent site features designed to treat stormwater before infiltrating it to the subsurface or discharging it to a surface water body. Regular inspection and maintenance of structural stormwater BMPs is critical for these engineered systems to function as designed (e.g., provide benefits to water quality, groundwater recharge, and peak flow attenuation).

This Standard Operating Procedure (SOP) provides general inspection and maintenance frequencies and procedures for eight common structural stormwater BMPs, including:

1. Bioretention Areas and Rain Gardens
2. Constructed Stormwater Wetlands
3. Extended Dry Detention Basins
4. Proprietary Media Filters
5. Sand and Organic Filters
6. Wet Basins
7. Dry Wells
8. Infiltration Basins

This SOP is based on the Massachusetts Stormwater Handbook and is not intended to replace the stormwater BMP Operation and Maintenance guidance contained in the Handbook. This SOP is also not intended to replace the Stormwater BMP Operation and Maintenance (O&M) Plan required by the Massachusetts Wetlands Protection Act, Order of Conditions.

The Wenham Highway Department is responsible for inspection and maintenance of municipally owned structural stormwater BMPs. A list of existing structural stormwater BMPs is included in the attachments, along with inspection and maintenance checklists for each type of BMP.

Structural stormwater BMPs will be inspected annually at a minimum. Inspection checklists for each type of structural BMP are provided in the attachments.

## Procedures

### Bioretention Areas and Rain Gardens

Bioretention areas and rain gardens are shallow depressions filled with sandy soil, topped with a thick layer of mulch, and planted with dense native vegetation. There are two types of bioretention cells:

1. Filtering bioretention area: Areas that are designed solely as an organic filter.
2. Exfiltration bioretention area: Areas that are configured to recharge groundwater in addition to acting as a filter.

**Inspection and Maintenance**

Regular inspection and maintenance are important to prevent against premature failure of bioretention areas or rain gardens. Regular inspection and maintenance of pretreatment devices and bioretention cells for sediment buildup, structural damage and standing water can extend the life of the soil media.

**Maintenance Schedule: Bioretention Areas and Rain Gardens**

Activity	Time of Year	Frequency
Inspect for soil erosion and repair	Year round	Monthly
Inspect for invasive species and remove if present	Year round	Monthly
Remove trash	Year round	Monthly
Mulch Void Areas	Spring	Annually
Remove dead vegetation	Fall and spring	Bi-annually
Replace dead vegetation	Spring	Annually
Prune	Spring or fall	Annually
Replace all media and vegetation	Late spring/early summer	As needed

When failure is discovered, excavate the bioretention area, scarify the bottom and sides, replace the filter fabric and soil, replant vegetation, and mulch the surface.

Never store snow within a bioretention area or rain garden. This would prevent the recharge and water quality treatment of ground water.

Wenham does not currently own or maintain any bioretention areas and rain gardens. In the event that the Town installs a bioretention area or rain garden, the operation and maintenance procedures outlined in this section shall apply.

**Constructed Stormwater Wetlands**

Constructed stormwater wetlands maximize pollutant removal from stormwater through the use of wetland vegetation uptake, retention, and settling. Constructed storm water wetlands must be used in conjunction with other BMPs, such as sediment forebays.

Wenham does not currently own or maintain any constructed stormwater wetlands. In the event that the Town installs a constructed stormwater wetland, the operation and maintenance procedures outlined in this section shall apply.

**Inspection and Maintenance**

Regular inspection and maintenance are important for the health of constructed stormwater wetlands. They help identify the need for replacement of vegetation and media, detect potentially harmful invasive species, and ensure the overall health of the wetland.

**Maintenance Schedule, Constructed Stormwater Wetlands: Years 0-3**

Activity	Time of Year	Frequency
Inspect for invasive species and remove if present	Year round	Monthly

Record and Map:	Year round	Annually
Types and distribution of dominant wetland plants	Year round	Bi-annually
Presence and distribution of planted wetland species	Spring	Annually
Presence and distribution of invasive species	Fall and spring	Bi-annually
Indications other species are replacing planted wetland species	Spring	Annually
Percent of standing water that is not vegetated	Spring or fall	Annually
Replace all media and vegetation	Late spring/early summer	As needed
Stability of original depth zones and micro-topographic features		
Accumulation of sediment in the forebay and micropool and survival rate of plants		

**Maintenance Schedule, Constructed Stormwater Wetlands: Years 4-Lifetime**

Activity	Time of Year	Frequency
Inspect for invasive species and remove if present	Year round	Monthly
Clean forebays	Year round	Annually
Clean sediment in basin/wetland system	Year round	Once every 10 years
Mulch Void Areas	Spring	Annually
Remove dead vegetation	Fall and spring	Bi-annually
Replace dead vegetation	Spring	Annually
Prune	Spring or fall	Annually
Replace all media and vegetation	Late spring/early Summer	As needed

Never store snow within a constructed stormwater wetland. This would prevent required water quality treatment and the recharge of groundwater.

**Extended Dry Detention Basins**

Extended dry detention basins are designed to control both stormwater quantity and quality. These BMPs are designed to hold stormwater for at least 24 hours, allowing solids to settle and reducing local and downstream flooding. Pretreatment is required to reduce the potential for overflow clogging. The outflow may be designed as either fixed or adjustable. Additional nutrient removal may be achieved by a micropool or shallow marsh.

Wenham does not currently own or maintain any extended dry detention basins. In the event that the Town installs a extended dry detention basin, the operation and maintenance procedures outlined in this section shall apply.

***Inspection and Maintenance***

Annual inspection of extended dry detention basins is required to ensure that the basins are operating properly. Potential problems include: erosion within the basin and banks, tree growth on the embankment, damage to the emergency spillway, and sediment accumulation around the outlet. Should any of these problems be encountered, necessary repairs should be made immediately.

**Maintenance Schedule: Extended Dry Detention Basins**

Activity	Time of Year	Frequency
Inspect basins	Spring and fall	Bi-annually and during and after major storms
Examine outlet structure for clogging or high outflow release velocities	Spring and fall	Bi-annually
Mow upper stage, side slopes, embankment and emergency spillway	Spring through fall	Bi-annually
Remove trash and debris	Spring	Bi-annually
Remove sediment from basin	Year round	At least once every 5 years

**Proprietary Media Filters**

Media Filters are designed to reduce total suspended solids and other target pollutants, such as organics, heavy metals, or nutrients – these materials are sorbed onto the filter media, which is contained in a concrete structure. The substrate used as filter media depends on the target pollutants, and may consist of leaf compost, pleated fabric, activated charcoal, perlite, amended sand in combination with perlite, and zeolite. Two types of Media Filters are manufactured: Dry media filters, which are designed to dewater within 72 hours, and wet media filters, which maintain a permanent pool of water as part of the treatment system.

Wenham does not currently own or maintain any proprietary media filters. In the event that the Town installs this type of BMP, the operation and maintenance procedures outlined in this section shall apply.

***Inspection and Maintenance***

Maintenance in accordance with the manufacturer’s requirements is necessary to ensure stormwater treatment. Inspection or maintenance of the concrete structure may require OSHA confined space training. Dry media filters are required to dewater in 72 hours, thus preventing mosquito and other insect breeding. Proper maintenance is essential to prevent clogging. Wet media filters require tight fitting seals to keep mosquitoes and other insects from entering and breeding in the permanent pools. Required maintenance includes routine inspection and treatment.

**Maintenance Schedule: Proprietary Media Filters**

Activity	Time of Year	Frequency
Inspect for standing water, trash, sediment and clogging	Per manufacturer’s schedule	Bi-annually (minimum)
Remove trash and debris	N/A	Each inspection
Examine to determine if system drains in 72 hours	Spring, after large storm	Annually
Inspect filtering media for clogging	Per manufacturer’s schedule	Per manufacturer’s schedule

**Sand and Organic Filters**

Sand and organic filters, also known as filtration basins, are intended for stormwater quality control rather than quantity control. These filters improve water quality by removing pollutants through a filtering media and settling pollutants on top of the sand bed and/or in a pretreatment basin. Pretreatment is required to prevent filter media from clogging. Runoff from the filters is typically discharged to another BMP for additional

treatment.

Wenham does not currently own or maintain any sand or organic media filters. In the event that the Town installs this type of BMP, the operation and maintenance procedures outlined in this section shall apply.

***Inspection and Maintenance***

If properly maintained, sand and organic filters have a long life. Maintenance requirements of the filters include raking the sand and removing sediment, trash, and debris from the surface of the BMP. Over time, fine sediments will penetrate deep into the sand requiring replacement of several inches or the entire sand layer. Discolored sand is an indicator of the presence of fine sediments, suggesting that the sand should be replaced.

**Maintenance Schedule: Sand and Organic Filters**

Activity	Frequency
Inspect filters and remove debris	After every major storm for the first 3 months after construction completion. Every 6 months thereafter.

**Wet Basins**

Wet basins are intended to treat stormwater quality through the removal of sediments and soluble pollutants. A permanent pool of water allows sediments to settle and removes the soluble pollutants, including some metals and nutrients. Additional dry storage is required to control peak discharges during large storm events. If properly designed and maintained, wet basins can add fire protection, wildlife habitats, and aesthetic values to a property.

Wenham does not currently own or maintain any wet basins. In the event that the Town installs this type of BMP, the operation and maintenance procedures outlined in this section shall apply.

***Inspection and Maintenance***

To ensure proper operation, wet basin outfalls should be inspected for evidence of clogging or excessive outfall releases. Potential problems to investigate include erosion within the basin and banks, damage to the emergency spillway, tree growth on the embankment, sediment accumulation around the outlet, and the emergence of invasive species. Should any of these problems be encountered, perform repairs immediately. An on-site sediment disposal area will reduce sediment removal costs.

**Maintenance Schedule: Wet Basins**

Activity	Time of Year	Frequency
Inspect wet basins	Spring and/or fall	Annually (Minimum)
Mow upper stage, side slopes, embankment and emergency spillway	Spring through fall	Bi-annually (Minimum)
Remove sediment, trash and debris	Spring through fall	Bi-annually (Minimum)
Remove sediment from basin	Year round	As required, but at least once every 10 years

**Dry Wells**

Dry wells are used to infiltrate uncontaminated runoff. These BMPs should never be used to infiltrate stormwater or runoff that has the potential to be contaminated with sediment and other pollutants. Dry wells provide groundwater recharge and can reduce the size and cost required of downstream BMPs or storm drains. However, they are only applicable in drainage areas of less than one acre and may experience high failure rates due to clogging.

Wenham does not currently own or maintain any dry wells. In the event that the Town installs this type of BMP, the operation and maintenance procedures outlined in this section shall apply.

***Inspection and Maintenance***

Proper dry well function depends on regular inspection. Clogging has the potential to cause high failure rates. The water depth in the observation well should be measured at 24 and 48 hour intervals after a storm and the clearance rate calculated. The clearance rate is calculated by dividing the drop in water level (inches) by the time elapsed (hours).

**Maintenance Schedule: Dry Wells**

Activity	Frequency
Inspect dry wells	After every major storm for the first 3 months after construction completion. Annually thereafter.

**Infiltration Basins**

Infiltration basins are designed to contain stormwater and provide groundwater recharge. Pollution prevention and pretreatment are required to ensure that contaminated stormwater is not infiltrated. Infiltration basins reduce local flooding and preserve the natural water balance of the site. High failure rates, however, often occur due to improper siting, inadequate pretreatment, poor design, and lack of maintenance.

Wenham does not currently own or maintain any infiltration basins. In the event that the Town installs this type of BMP, the operation and maintenance procedures outlined in this section shall apply.

***Inspection and Maintenance***

Regular maintenance is required to prevent clogging, which results in infiltration basin failure. Clogging may be due to upland sediment erosion, excessive soil compaction, or low spots. Inspections should include signs of differential settlement, cracking, erosion, leakage in the embankments, tree growth on the embankments, riprap condition, sediment accumulation, and turf health.

**Maintenance Schedule: Infiltration Basins**

Activity	Time of Year	Frequency
Preventative maintenance	Spring and fall	Bi-annually
Inspection	Spring and fall	After every major storm for the first 3 months after construction completion. Bi-annually thereafter and discharges through the high outlet orifice.
Mow/rake buffer area, side slopes and basin bottom	Spring and fall	Bi-annually
Remove trash, debris and organic matter	Spring and fall	Bi-annually

**Employee Training**

- Employees who perform inspection or maintenance on structural BMPs are trained once per year on proper procedures.
- If services are contracted, the contractor should be given a copy of this and any applicable SOPs to ensure compliance with MS4 regulations.

**Attachments**

1. Structural BMP Inspection and Maintenance Checklist

Date: \_\_\_\_\_  
Representative(s): \_\_\_\_\_

## Annual Stormwater BMP Inspection and Maintenance Form

Location: \_\_\_\_\_

### General Questions (apply to all BMPs)

	Yes	No	N/A	
Has trash accumulated in the BMP?	_____	_____	_____	(1)
Is there visible erosion, settlement, or structural damage?	_____	_____	_____	(1)
Are there any obstructions or clogs at the inlet or outlet?	_____	_____	_____	(1)
Is there water in the BMP above the outflow invert?	_____	_____	_____	(1) (2)

(complete all that apply)

Infiltration System

Average Sediment Depth: \_\_\_\_\_ (Cleaning is required when this exceeds 3" in chambers)

Vortechs (Model # \_\_\_\_\_)

Water Depth to Sediment: \_\_\_\_\_ (Cleaning is required when this is < 18")

Floatable Layer Thickness: \_\_\_\_\_ (Cleaning is required when this is > 2")

Stormceptor (Model # \_\_\_\_\_)

Water Depth to Sediment: \_\_\_\_\_ (See appendix for sediment depths necessitating cleaning)

Detention Basin/ Pond

Are there any upstream or downstream conditions that may impact basin/ pond operation? (Y/N)  
If YES include notes to clarify changed conditions.

Drywell(s) Quantity: \_\_\_\_\_

Indications of Hazardous Substances? (Y/N)

Average Sediment Depth: \_\_\_\_\_

Deep Sump CB Quantity: \_\_\_\_\_ (include a sketch if more than one)

Sediment Depth(s): \_\_\_\_\_ (Cleaning is required if sediment exceeds 2')

Bioretention Area

Has mulch recently been replaced? (Y/N)

Sediment Forebay

Average Sediment Depth: \_\_\_\_\_ (Cleaning is required if sediment exceeds 2')

Grass Length: \_\_\_\_\_ (Mowing is required if grass is longer than 6")

### Notes/ Recommendations:

(1) If the answer is "YES" clarifying notes and photographs are required. Maintenance may be necessary.  
(2) For drywells and infiltration systems the invert is the base of the system.

## APPENDIX H

### Standard Operating Procedure – Salt Use Optimization/ Winter Road Maintenance

#### H.1: Salt Use Optimization/ Winter Road Maintenance

<b>STANDARD OPERATING PROCEDURE</b> <b>DEPARTMENT OF PUBLIC WORKS [OR OTHER]</b>  <b>PROGRAM:</b> Snow Removal and De-Icing	<b>SOP NUMBER:</b>	<b>ISSUE DATE:</b>
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**APPROVED BY:**

\_\_\_\_\_  
Bill Tyack - Public Works Director [or other]

**MA SMALL MS4 PERMIT REQUIREMENT SUMMARY:**

**Part 2.3.7.a.iii.5.**

The permittee shall establish and implement procedures for winter road maintenance including the use and storage of salt and sand; minimize the use of sodium chloride and other salts, and evaluate opportunities for use of alternative materials; and ensure that snow disposal activities do not result in disposal of snow into waters of the United States. For purposes of this MS4 Permit, salt shall mean any chloride-containing material used to treat paved surfaces for deicing, including sodium chloride, calcium chloride, magnesium chloride, and brine solutions.

**Personnel**

The following personnel are responsible for snow and ice removal. Employees performing the procedures in this SOP shall attend yearly stormwater pollution prevention training.

**TABLE 1**

Name	Responsibility
Keith Carter	12' Plow on Loader
Travis Good	Peterbilt 11' Plow with Wing & Sander
Patrick Nolan	International 11' Plow with Sander
Shawn Davis	1 Ton Dump with 9' Plow & Sander
William Wildes	Pickup with 8' Plow
Sean McCarthy	1 Ton Dump with 9' plow
Alex Mackey	Pickup with 8' Plow
William Tyack	Pickup with 8' Plow
Lenny Tuneburg	Utility Truck with 8' Plow

**Equipment**

The municipality owns and maintains ice control and snow removal equipment listed in Table 2. Equipment maintenance shall be conducted consistent with the Vehicles and Equipment maintenance SOP found here: **[91 Grapevine Rd- DPW GARAGE]**. The wash bay/ area is located at: **[DPW GARAGE]**

**Plowing**

When conditions warrant, plows are installed on the **[ 3 ]** larger trucks to move snow from the traveled roadway. Average time to install a plow is approximately **[10]** minutes. **[7]** smaller trucks are available for plowing of residential streets and clearing public lots.

<b>STANDARD OPERATING PROCEDURE</b> <b>DEPARTMENT OF PUBLIC WORKS [OR OTHER]</b>  <b>PROGRAM:</b> Snow Removal and De-Icing	<b>SOP NUMBER:</b>	<b>ISSUE DATE:</b>
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**Salt & Sand Spreaders**

When conditions warrant, salt spreaders are installed on the [3] larger trucks to spread salt on the traveled roadway. Each salt spreader is calibrated prior to the deicing season and every [2 weeks] thereafter. Salt /Sand application shall be calibrated to dispense rates of [500] pounds per lane mile [2] of trucks are equipped with brine tanks which are calibrated prior to the deicing season and every [2 weeks] thereafter.

**TABLE 2**

Equipment Number	Make	Description	Additional Equipment	Primary Use
[00001]	[XXXX]	[12-yard dump truck]	[4-yard salt spreader. 11' Side-cast plow]	[General Salting and Plowing]
601	2002 Chevrolet	7 Yard Dump		
602	International	10 Yard Dump	10' w/Wing Plow, 7 Yard Sander 75 Gal. Tanks Liquid Safe Melt.	10' w/Wing Plow, 7 Yard Sander
603	Peterbilt	10 Yard Dump	10' w/Wing Plow, 7 Yard Sander 75 Gal. Tanks Liquid Safe Melt.	10' w/Wing Plow, 7 Yard Sander
604	GMC	Pick-Up	8' Plow	
605	Chevrolet	1 Ton Dump	9' Plow	
606	Chevrolet	Pick-Up	8' Plow	
607	John Deere	Front End Loader	11' Plow	
610	Chevrolet	1 Ton Dump	2 yd. Salt Spreader 9' Plow	Sanding & Plowing
65	Chevrolet	Utility Truck	8' Plow	

Other Equipment available from other divisions:  
**[Water Department, Chevrolet Utility Truck 8' Plow. Primary use is plowing.]**

**Materials**

The major materials used in snow and ice control are coarse sand, coarse salt, anti-icing agent. These materials are stockpiled in advance of an event and are immediately available when needed and stocks are replenished between events.

**Sand**

Sand is used as an abrasive for traction on slick roadways. Approximately [179.54] cubic yards are anticipated to be used per year and are ordered from **Bentley Warren Trucking** prior to each deicing season. Sand is stored in the covered facility located at: [enter location(s) of storage]. Loading areas and yards are swept [as needed] to prevent sand build-up and run-off.

<b>STANDARD OPERATING PROCEDURE</b> <b>DEPARTMENT OF PUBLIC WORKS [OR OTHER]</b>  <b>PROGRAM:</b> Snow Removal and De-Icing	<b>SOP NUMBER:</b>	<b>ISSUE DATE:</b>
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**Salt**

Salt is used to expedite the melting of snow and ice from the street surface and also to keep the ice from forming a bond to the street surface. Approximately [985 ] tons of [coarse salt] are anticipated to be used per year and are ordered from [Eastern Minerals-Boxford Salt Consortium ] prior to each deicing season. Salt is stored in the covered facility located at: [91 Grapevine Rd.]. Loading areas and yards are swept [as needed ] to prevent salt build-up and run-off.

**Anti-icing and Pre-Wetting Chemical**

Approximately [2500] gallons of [Safe Melt ] is estimated to be needed for anti-icing application. These chemicals are stored at 91 Grapevine Rd.] in [3000] gallon storage tanks equipped with appropriate spill control.

**Procedures**

Anti-Icing –N/A

<b>STANDARD OPERATING PROCEDURE</b> <b>DEPARTMENT OF PUBLIC WORKS [OR OTHER]</b>  <b>PROGRAM:</b> Snow Removal and De-Icing	<b>SOP NUMBER:</b>	<b>ISSUE DATE:</b>
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**Salt & Sand Application**

1. Whenever conditions warrant, salt is applied to the roadway prior to accumulation of snow to prevent compacted snow from bonding to the roadway surface. **[Police Dept. or DPW Director]** will instruct staff when salt application is appropriate.
2. Prior to salt application, equipment will be checked to ensure proper working order and ensure proper calibration of equipment. All fluid levels will be checked and filled to proper levels, all lights must be in working order. A visual walk-around inspection of the truck or equipment must be made. Any repairs must be made and reported to a supervisor or mechanic before leaving the yard.
3. The standard salt application speed is: **[20]** mph.
4. Follow the prioritized route or schedule. This schedule is located at: **[EAST/WEST Side of Town]**
5. Before parking any truck or equipment after use, all fluid levels will be checked and filled. All minor repairs will be done by the operator. Any repairs the operator cannot perform will be written up on the proper forms and turned in to **[Patrick Nolan]**. **[Patrick Nolan]** will determine importance and will assign the repairs according to schedule. All deicing chemical will be washed from equipment at the wash bay or designated wash area.

**Snow Plowing**

1. As the storm develops and **[3 ]** inches of snow has accumulated, all of the drivers and available equipment will begin to plow their assigned routes.
2. Prior to plowing operations, equipment will be checked to ensure proper working order. All fluid levels will be checked and filled to proper levels, all lights must be in working order. A visual walk-around inspection of the truck or equipment must be made. Any repairs must be made and reported to a supervisor or mechanic before leaving the yard.
3. Avoid plowing, pushing, blowing or storing excess snow, deicer, or other debris in or near creeks, watercourses or storm drainage systems.
4. Reduce plowing speed in sensitive areas (near creeks, wetlands or other water courses) to prevent snow and deicing materials from entering waterways.
5. The standard plowing speed is: **[15-20 ]** mph.
6. Follow the prioritized route or schedule.
7. Before parking any truck or equipment after use, all fluid levels will be checked and filled. Blades or bolts, which need replacing, will be taken care of unless told to do otherwise. Chains that need repairs will be repaired. All minor repairs will be done by the operator. Any repairs the operator cannot perform will be written up on the proper forms and turned in to **[Patrick Nolan]**. **[Patrick Nolan]** will determine importance and will assign the repairs according to schedule.

<p><b>STANDARD OPERATING PROCEDURE</b>  <b>DEPARTMENT OF PUBLIC WORKS [OR OTHER]</b></p> <p><b>PROGRAM:</b>  Snow Removal and De-Icing</p>	<p><b>SOP NUMBER:</b></p>	<p><b>ISSUE DATE:</b></p>
<p><b>Record Keeping and Documentation</b></p> <ol style="list-style-type: none"> <li>1. Maintain a master schedule of prioritized snow and sanding routes and the miles or roads plowed or sanded. <b>[DPW Director’s Office-91 Grapevine Rd.]</b></li> <li>2. Keep copies of manufacturer’s recommendations for equipment calibration, plowing speed and salt/sand application rates. <b>[DPW Director’s Office-91 Grapevine Rd.]</b></li> <li>3. Keep records of the amounts of salt, sand, liquid deicer, and salt alternatives applied per season. <b>[Town Hall – DPW Office, 138 Main Street, Wenham, MA]</b></li> <li>4. Keep a list of all employees trained in the facility’s Stormwater Pollution Prevention binder or computer file.</li> </ol>		