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# STORMWATER MANAGEMENT PLAN

MS4 GENERAL PERMIT COMPLIANCE

JUNE 2019  
UPDATED JUNE 2023



TOWN OF  
**West Boylston**  
MASSACHUSETTS

# swmp

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## 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.”

Printed Name \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

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## 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 West Boylston as determined by the USEPA using the latest decennial (year 2010) census. Since West Boylston is located within an urbanized area, the EPA has designated the Town of West Boylston 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, West Boylston 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 West Boylston 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 September 26, 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 February 1, 2019 for a 30-day period. The Town received authorization from EPA to discharge under the 2016 MS4 Permit on March 5, 2019. A copy of the Town's Authorization to Discharge is included in Appendix D. The 2016 MS4 Permit expired on June 30, 2022, and has been administratively continued for covered permittees until a new permit is issued.

Since the Town of West Boylston was previously covered under the 2003 Small MS4 General Permit, the Town currently had some existing practices and programs in place related to stormwater management and pollution prevention prior to the effective date of the new permit. 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 Select Board, which is comprised of five (5) board members, is the governing body for the Town of West Boylston. The Town Administrator reports to the Select Board and is tasked with the day-to-day running of the Town including proper administration of all Town affairs. The Department of Public Works, through its Director, is responsible for maintaining town roads and facilities.

Several entities within the Town are involved in stormwater management from implementation of controls during development to general maintenance of drainage infrastructure, and include the following:

- Department of Public Works
- Planning Board



- Conservation Commission
- Building Department
- Health Department

Specific representatives from those departments that are responsible for implementation of the SWMP are outlined in the table below:

Table 1.1 PARTIES RESPONSIBLE FOR SWMP IMPLEMENTATION		
Name	Title	Affiliation
Jennifer Warren-Dyment	Town Administrator	Town Government
Kevin Duffy	Director	Department of Public Works
Sarah Miles	Chair	Planning Board
Toby Goldstein	Assistant to Conservation Commission	Conservation Commission
George Tignor	Building Inspector / Commissioner,	Building Department
Jessica Prichard	Administrative Assistant	Health Department

**1.3 Town Demographic Information**

The Town of West Boylston is located in Worcester County and has a total area of 13.8 square miles (35.8 square kilometers). It is bordered by Sterling to the north, Boylston to the east, Worcester to the south, Shrewsbury to the southeast, and Holden to the west. As of the 2010 census, the population was 7,669 with a population density of 592 people per square mile. The Town was incorporated in 1808 and resides at an elevation of 481 feet. The Town is comprised of 12.9 square miles of land and 0.9 square miles or 6.86% water.

Territory comprised of densely settled tracts and adjacent 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. Approximately 45% of West Boylston is comprised of urbanized area (UA), as shown in the regulated area map in Appendix B.

Principal highways located within the boundaries of West Boylston include Route 140 which is known locally as North Main Street, Beaman Street, Sterling Street, Worcester Street and Temple Street, and runs northwest to southeast, Route 12 which is known locally as West Boylston Street and Sterling Street and runs north to south, Route 100 which is known locally as Lancaster Street and runs northeast to southwest, and Interstate 190, which runs northeast to southwest. There are approximately 16 miles of state-maintained roadways within town.

Climate within the Town of West Boylston ranges from January average minimum temperature of 14.4 degrees Fahrenheit (°F) to July average maximum temperature of 81.2°F. The average annual

precipitation is 48 inches, distributed throughout the year. The rainiest month is October, with approximately 4.5 inches of rain.

#### 1.4 Water Resources

The Town is comprised of 0.9 square miles (6.9%) of water, and the Town is located mostly within the Nashua River Watershed. The southernmost portion of town is located within the Blackstone River Watershed. The primary impaired water bodies in town include the Wachusett Reservoir, Gates Brook, Poor Farm Brook, Muddy Brook, Malden Brook, Scarletts Brook, and the Quinapoxet River. These water bodies are impaired for several factors according to the Final 2018/2020 303(d) list of Impaired Waters. All impairments and outfalls discharging to these water bodies are summarized in Table 1.2. Outfalls discharging to waters of the United States are considered regulated under the MS4 Permit. During recent dry weather outfall screening, field verification confirmed the regulated status of each outfall. Outfalls included in the table below are believed to be under the Town's jurisdiction. However, if any of these outfalls are determined to be private or under the jurisdiction of another state entity in the future, they will be removed.

Table 1.2 RECEIVING WATERS AND IMPAIRMENTS

Waterbody	Impairment	Number of Outfalls Discharging to Receiving Water
Wachusett Reservoir (MA81-147)	(Brittle Naiad, Najas Minor*), (Eurasian Water Milfoil, Myriophyllum Spicatum*), (Fanwort*), (Non-Native Aquatic Plants*), Mercury in fish tissue <sup>+</sup>	4
Unnamed tributary to Wachusett Reservoir crossing North Main St (MA81-54)	Chloride	4
Unnamed tributary to Wachusett Reservoir from Carrolls Pond (MA81-49)	Chloride	10
Gates Brook (MA81-24)	Chloride, Escherichia Coli (E. Coli), Fecal Coliform	28
Poor Farm Brook (MA51-17)	(Dewatering*), Aquatic Plants (Macrophytes), Escherichia Coli (E. Coli), Temperature	6
Malden Brook (MA81-27)	Temperature	4
Muddy Brook (MA81-28)	Benthic Macroinvertebrates	0
Scarletts Brook (MA81-25)	Chloride	0
Quinapoxet River (MA81-32)	(Dewatering*), Temperature	0
Washacum Brook (MA81-47)	Dissolved Oxygen	0
Gates Brook Wetlands	-	3

Table 1.2 RECEIVING WATERS AND IMPAIRMENTS

Waterbody	Impairment	Number of Outfalls Discharging to Receiving Water
Wetland off Shady Lane	-	1
Unnamed Pond near 145 Maple St.	-	2
Unnamed Pond off N. Main St.	-	1
Unnamed wetland behind Goodale	-	3
Waschacum Brook Wetlands	-	5
Wetland near Henry St.	-	3
Wetland near Prospect Street	-	4
Wetland near Oxford St.	-	1
Wetlands near Century Dr.	-	4
Poor Farm Brook Wetland	-	1
Malden Brook Wetlands	-	1
Muddy Brook Wetlands	-	3
Wetland off Shrine Avenue	-	1
Wetland off Sterling Place	-	1

\*TMDL not required, non-pollutant.

\*Impairments which have an approved TMDL. Applicable TMDLs are identified in Section 6.0.

### 1.5 Interconnections

The Town of West Boylston has identified eight (8) locations where the Town's MS4 discharges to or receives flow from another MS4 under another entity's jurisdiction. The catchments associated with these junction points have been delineated. These interconnections are included on the town-wide drainage map located at the end of this report in Appendix E and are summarized in Table 1.3.

Table 1.3  
INTERCONNECTIONS AND IMPAIRMENTS

Interconnection and/or Drainage Area ID	Connecting Entity	Discharges To/Receives Flow from West Boylston's MS4	Receiving Water	Impairment
DMH-1	City of	West Boylston's	-	

Table 1.3  
INTERCONNECTIONS AND IMPAIRMENTS

Interconnection and/or Drainage Area ID	Connecting Entity	Discharges To/Receives Flow from West Boylston's MS4	Receiving Water	Impairment
	Worcester	MS4 Discharges to Worcester's MS4		-
DMH-107	MassDOT	West Boylston's MS4 Discharges to MassDOT Drainage System	Gates Brook	Chloride, Escherichia Coli (E. Coli), Fecal Coliform
DMH-169	MassDOT	West Boylston's MS4 Discharges to MassDOT Drainage System	Water Infiltrates Prior to Reaching Receiving Water	-
DMH-180	MassDOT	West Boylston's MS4 Discharges to MassDOT Drainage System	Wachusett Reservoir – Water Infiltrates Prior to Reaching Receiving Water	(Brittle Naiad, Najas Minor*), (Eurasian Water Milfoil, Myriophyllum spicatum*), (Fanwort*), (Non-Native Aquatic Plants*), Mercury in fish tissue <sup>+</sup>
DMH-181	MassDOT	West Boylston's MS4 Discharges to MassDOT Drainage System	Wachusett Reservoir – Water Infiltrates Prior to Reaching Receiving Water	(Brittle Naiad, Najas Minor*), (Eurasian Water Milfoil, Myriophyllum spicatum*), (Fanwort*), (Non-Native Aquatic Plants*), Mercury in fish tissue <sup>+</sup>
DMH-332	City of Worcester	West Boylston's MS4 Discharges to Worcester's MS4	Gates Brook	Chloride, Escherichia Coli (E. Coli), Fecal Coliform
DMH-336	City of Worcester	West Boylston's MS4 Discharges to Worcester's MS4	Water Infiltrates Prior to Reaching Receiving Water	-
DMH-406	City of	West Boylston's	Gates Brook	Chloride, Escherichia

**Table 1.3  
INTERCONNECTIONS AND IMPAIRMENTS**

Interconnection and/or Drainage Area ID	Connecting Entity	Discharges To/Receives Flow from West Boylston's MS4	Receiving Water	Impairment
	Worcester	MS4 Discharges to Worcester's MS4		Coli (E. Coli), Fecal Coliform

**1.6 Endangered Species and Historic Properties Determination**

The 2016 MS4 Permit requires that West Boylston 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 not critical habitat for any endangered species within its boundaries, and if such a habitat exists, that any best management practices implemented will not interfere with that habitat. West Boylston must also certify that any discharge will not impact 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 West Boylston 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.

Under the Historic Preservation Act, West Boylston 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 historic properties, including: Beaman Memorial Public Library, the Bigelow Tavern Historic District, the Mount Vernon Cemetery, the Oakdale Village Historic District, the Old Stone Church, and the Quinapoxet River Bridge. It has been determined to be very unlikely that any disturbance due to installing BMPs would impact any of these historic 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.

**1.7 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 West Boylston 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 West Boylston 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.

## 1.8 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. According to data available from MassGIS, there are Class A and B surface water protection zones associated with the Wachusett Reservoir, which is a source of water for the Massachusetts Water Resources Authority water system, which supplies public drinking water to Boston and surrounding communities. Catchments that discharge to the Wachusett Reservoir or its tributaries in West Boylston will be prioritized in the implementation of this SWMP. Pretreatment and spill control measures for these stormwater discharges will be provided to the extent feasible.

## 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 September 26, 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. These BMPs will be implemented over the next five years (i.e. the permit term). However, the Town will have up to 15 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. BMPs implemented in compliance with the 2003 MS4 Permit are summarized in annual reports submitted to EPA between 2004 and 2018, which are referenced 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 timeframes and individuals responsible for implementation are stated in each of the respective sections for each control measure in this plan. The Department of Public Works, the Planning Board, the Health Department and the Conservation Commission will be responsible for implementation and/or future enforcement of a majority of the BMPs for each of 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.

Checklists outlining requirements for Permit Years 1 through 5 are included in Appendix F.

### 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. West Boylston has been participating in public education and outreach activities since the 2003 MS4 Permit was enacted and will continue to expand on those activities under the 2016 MS4 Permit, as detailed below.

#### **Regulatory Requirement:**

Section 2.3.2 of the 2016 MS4 Permit requires the permittee 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 West Boylston has implemented several public education initiatives. The Town maintains a stormwater page on their website: <https://www.westboylston-ma.gov/public-works/pages/stormwater-management>. The Town's Board of Health also maintains a brochure on their website informing residents about dog waste and its impacts on surface water quality. The brochure was developed by DCR and focuses specifically on pet waste management within the watershed for the Wachusett Reservoir.

The Town of West Boylston has available an informational message about pet waste management at the Town Hall and posts messaging on the Board of Health website reminding residents to pick up after their dog and that, when improperly disposed of, dog waste causes water pollution. The Town is a participant in the Central Massachusetts Regional Stormwater Coalition (CMRSWC), which supported the development of the ThinkBlue Massachusetts state-wide educational campaign.

The 2016 MS4 Permit requires additional public education measures. West Boylston 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 will implement the following BMPs:

**BMP: Social Media Outreach - Video**

**Description:** Distribute educational materials to residents through social media.

**Targeted Audiences:** Residents

**Responsible Department/Parties:** DPW

**Measurable Goals:** The Town will track ad impressions on Facebook, Instagram and You Tube.

**Implementation Timeframe:** Completed during Permit Years 1-5.

**BMP: Brochures/ Pamphlets**

**Description:** Distribute educational materials about proper pet waste disposal and how the public can impact stormwater and receiving water quality.

**Targeted Audiences:** Residents

**Responsible Department/Parties:** DPW

**Measurable Goals:** The Town will count the number of notices sent out with the quarterly Town newsletter each year.

**Implementation Timeframe:** Completed during Permit Years 1-5.

**BMP: Brochures/Pamphlets**

**Description:** Information about West Boylston's stormwater management program targeting residents and how they can impact stormwater and receiving water quality is sent out in the Fall Town Meeting Notice.

**Targeted Audiences:** Residents

**Responsible Department/Parties:** DPW



**Measurable Goals:** The Town will track the number of flyers sent annually.

**Implementation Timeframe:** Completed during Permit Years 1-5.

**BMP: Brochures/Pamphlets**

**Description:** Target groups likely to impact stormwater through lawn maintenance, building maintenance, de-icing materials being stored and used, and unswept parking lots when applicable using brochures.

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

**Responsible Department/Parties:** DPW

**Measurable Goals:** The Town will count the number of brochures sent out annually.

**Implementation Timeframe:** Completed during Permit Year 4 (FY2022). Educational material was sent to all gas stations on June 8, 2022.

**BMP: Web Page**

**Description:** Target groups likely to impact stormwater through lawn maintenance, building maintenance, de-icing materials being stored and used, and unswept parking lots when applicable by placing this information on the Town website.

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

**Responsible Department/Parties:** DPW

**Measurable Goals:** The Town will track the number of times that the information on their website is viewed.

**Implementation Timeframe:** Completed during Permit Year 5 (FY2023).

**BMP: Brochures/Pamphlets**

**Description:** Enforce Stormwater Management bylaws during and after construction. Make information available in the Building and Planning Departments.

**Responsible Department/Parties:** DPW; Building Permitting and Enforcement

**Measurable Goals:** The Town will make information regarding proper sediment and erosion control aimed at developers available.

**Implementation Timeframe:** Completed during Permit Year 4 (FY2022). Educational material was sent to all licensed drainlayers on June 8, 2022.

**BMP: Web Page**

**Description:** Enforce Stormwater Management bylaws during and after construction. Place information on the Town's website about proper sediment and erosion control measures.

**Targeted Audiences:** Developers (Construction)

**Responsible Department/Parties:** DPW; Building Permitting and Enforcement

**Measurable Goals:** The Town will count the number of Stormwater Management permits issued. The Town will place informational material regarding proper sediment and erosion control aimed at developers on the website and track the number of times that this information is viewed.

**Implementation Timeframe:** Completed during Permit Year 4 (FY2022).

**BMP: Brochures/Pamphlets**

**Description:** Distribute educational materials about equipment inspection, waste disposal, dumpster maintenance, de-icing materials storage and use, and parking lot sweeping.

**Targeted Audiences:** Industrial Facilities

**Responsible Department/Parties:** DPW, Building Department

**Measurable Goals:** The Town's DPW will distribute brochure and maintain a list of all recipients.

**Implementation Timeframe:** Completed during Permit Years 4-5.

**BMP: Web Page**

**Description:** Post educational materials about equipment inspection, waste disposal, dumpster maintenance, de-icing materials storage and use, and parking lot sweeping on the Town’s website.

**Targeted Audiences:** Industrial Facilities

**Responsible Department/Parties:** DPW

**Measurable Goals:** The Town will track the number of times that the information on their website is viewed.

**Implementation Timeframe:** Completed during Permit Year 5 (FY2023).

Public education materials utilized in the implementation of the Town’s SWMP through Permit Year 4 are included in Appendix G.

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 West Boylston has provided multiple opportunities for public involvement and participation. The Town is part of the Wachusett Watershed Regional Recycling Center, which holds four hazardous waste collection days per year and is open to all residents. The Town holds an annual town-wide clean-up on Earth Day. The Town also continues to implement a “Pay-As-You-Throw” initiative for household waste management while offering single-stream recycling, encouraging residents to recycle and reducing trash.

In addition to continuing the above practices, it is recommended that the Town allow for public review of this stormwater management plan, by posting on the Town’s website. These BMPs and others that the Town has committed to are detailed below.

**BMP: Public Review**

**Description:** Stormwater Management Plan Review

**Responsible Department/Parties:** DPW/ Planning Board

**Measurable Goals:** Allow annual review of stormwater management plan and posting of stormwater management plan on website to facilitate resident input and involvement.

**Implementation Timeframe:** Provided during Permit Year 4 (FY2022) and an opportunity for public input will be provided annually for the duration of the permit by posting of the SWMP on the Town’s website for public review and input. During Permit Year 5, a presentation was also made to the Select Board on April 5, 2023 regarding the status of the Town’s compliance with the MS4 Permit.

**BMP: Public Participation**

**Description:** Household Hazardous Waste/Used Oil Collection

**Responsible Department/Parties:** DPW, Schools

**Measurable Goals:** Continue hazardous waste days at the Wachusett Recycling Center. Implement town-wide roadside cleanup day starting October 13, 2018. Educate on stormwater management in classrooms. Have public hearings for projects. The DPW accepts used oil year-round.

**Implementation Timeframe:** Completed during Permit Year 1 and will be continued for the duration of the permit.

**BMP: Public Participation**

**Description:** Yard Waste Collection

**Responsible Department/Parties:** DPW

**Measurable Goals:** Continue yard waste collection days at the Laurel Street Yard Waste Facility.

**Implementation Timeframe:** Completed during Permit Years 1-5 and will continue for the duration of the Permit. A link to the collection schedule is sent out prior to all yard waste events via email to the 574 DPW news subscribers.

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.”

The requirements of the 2016 MS4 Permit can be achieved through implementation of the following BMPs:

**BMP: SSO Inventory**

**Description:** Develop an inventory of where Sanitary Sewer Overflows (SSOs) have discharged to the Town’s MS4 within the 5 years prior to the permit effective date and update this inventory annually going forward. The inventory must include the following: SSO location, whether the discharge entered the MS4 or a surface water directly, date and time that the SSO occurred, estimated discharge volume, known or suspected cause of the discharge, and mitigation or corrective measures completed or planned with implementation timeframes.

**Responsible Department/Parties:** DPW/External Contractor

**Measurable Goals:** Complete within 1 year of the permit effective date and continue to update SSO inventory annually.

**Implementation Timeframe:** Completed during Permit Year 1 (FY2019) and will be continued for the duration of the permit.

**BMP: Storm Sewer System Map**

**Description:** Continue to update existing drainage map, as needed, to address permit requirements and continue to update during IDDE program implementation.

**Responsible Department/Parties:** DPW

**Measurable Goals:** Update the Town’s existing drainage map to include a full inventory of the Town’s storm drain system including the following within 2 years of the permit effective date:

- all outfalls and receiving waters (*mapped*),

- open channel conveyances,
- interconnections with other MS4s (*mapped*),
- municipally-owned stormwater treatment structures (*mapped*),
- impaired waterbodies (*mapped*), and
- initial catchment delineations (*mapped*).

Within 10 years of the permit effective date, this map shall also include:

- location of outfalls with an accuracy of +/- 30 feet (*mapped*),
- all pipes (*mapped*),
- manholes (*mapped*),
- catch basins (*mapped*),
- refined catchment delineations (*mapped*), and
- municipal sanitary sewer system.

In addition, EPA suggests adding, but does not require, the following information, some of which the Town is actively working to incorporate:

- storm and sanitary sewer material, size and age,
- privately-owned stormwater treatment structures,
- septic systems and areas likely to be affected by septic leaching,
- seasonal high-water table elevations,
- topography,
- orthography,
- alignments, dates and representation of illicit discharge remediation, and
- locations of suspected, confirmed and corrected illicit discharges.

**Implementation Timeframe:** The Town developed storm drain system mapping to meet the Year 2 requirements outlined above during Permit Year 4 (FY2022) and will continue to update mapping as needed utilizing information collected during field investigations, road reconstructions efforts and development projects until complete by Permit Year 10 (FY2028).

**BMP: Written IDDE Program**

**Description:** Create a written IDDE plan that documents all elements of the Town's IDDE Program, including program responsibilities and procedures, and meets the conditions of the permit.

**Responsible Department/Parties:** Planning Board/DPW

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

**Implementation Timeframe:** The Town completed a written IDDE Plan, which is included under separate cover, during Permit Year 4 (FY2022).

**BMP: Implement IDDE Program**

**Description:** Implement catchment investigations according to program and permit conditions, including TV inspection, smoke testing and dye testing as needed to identify illicit connections.

**Responsible Department/Parties:** Planning Board/DPW/Conservation Commission

**Measurable Goals:** Implement and enforce practices set forth in the written IDDE plan and IDDE bylaw. Track the number of illicit connections that are identified and removed annually.

**Implementation Timeframe:** The Town began catchment investigations in Permit Year 5 and will continue investigations annually until completion in Permit Year 10 (FY2023, FY2028).

**BMP: Employee Training**

**Description:** Train employees on IDDE implementation.

**Responsible Department/Parties:** Building Department, Health Department, Conservation Commission, DPW

**Measurable Goals:** Conduct annual training developed in accordance with the IDDE plan. Track the number of employees that receive training annually and the dates on which training is held.

**Implementation Timeframe:** Completed during Permit Years 4 and 5 (FY2022, FY2023). Training will continue to be conducted annually going forward.

**BMP: Conduct Dry Weather Screening**

**Description:** Conduct dry weather screening in accordance with outfall screening procedure and permit conditions as included in the Town's IDDE Plan.

**Responsible Department/Parties:** DPW

**Measurable Goals:** Visit every regulated outfall, record current conditions, and obtain samples of any flow that is present. Use test kits, in conjunction with an external laboratory, to test for the presence of any indicators.

**Implementation Timeframe:** Completed during Permit Year 4 (FY2022).

**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:** DCR, DPW

**Measurable Goals:** Less than 24 hours after a rain event, visit any outfall determined to require additional screening (i.e. any outfall that has one or more system vulnerability factors) and obtain samples of any flow that is present and use test kits, in conjunction with an external laboratory, to test for any indicators. Complete all wet weather screening and sampling within 10 years of the permit effective date. Track the number of outfalls that are screened and sampled annually.

**Implementation Timeframe:** Complete within 10 years of the permit effective date (FY2028).

**BMP: Ongoing Screening**

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

**Responsible Department/Parties:** DPW

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

**Implementation Timeframe:** 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.

**Responsible Department/Parties:** DPW, Health Department

**Measurable Goals:** The Town will assess within existing catchments the potential for illicit discharges by obtaining data about:

- past complaints

- poor receiving water quality
- density of generating sites
- age of surrounding infrastructure
- previous sewer conversion
- presence of historically combined sewer systems
- surrounding septic systems
- presence of culverted streams
- approved TMDLs or known impairments of the receiving water body
- and any other relevant characteristics.

Using this and any other available data, the Town will rank each outfall in each catchment into one of four categories:

1. Problem outfalls – that have known discharges
2. High Priority outfalls – that discharge to an area of concern (drinking water, public beaches, recreational areas, shellfish beds, or other)
3. Low Priority outfalls – that do not fit into the other categories but require sampling
4. Excluded outfalls – that have no potential for illicit discharges and are exempt from the IDDE program.

**Implementation Timeframe:** Completed during Permit Year 4 (FY2022).

#### **BMP: Follow-up Ranking**

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

**Responsible Department/Parties:** DPW

**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.

**Implementation Timeframe:** Completed during Permit Year 4 (FY2022).

#### **BMP: Catchment Investigation Procedures**

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

**Responsible Department/Parties:** DPW

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

**Implementation Timeframe:** Completed during Permit Year 4 (FY2022).

#### *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:**

West Boylston’s Earth Removal Bylaw (Article 22) requires provisions for safe drainage of water and for the prevention of wind or water erosion that could transport material onto adjoining properties. The Town’s Zoning Bylaw requires site plans to demonstrate that a development will not pollute

surface or groundwater, result in soil erosion, increase runoff, change groundwater levels, nor increase flooding during or after construction. The current site plan procedure is outlined in the Town's Zoning Bylaw in Section 3.6. The Town's Subdivision Regulations include erosion and sediment control regulations which detail activities that may result in increases in sediment-laden runoff and streambank erosion along bodies of water and require review and approval as part of the Subdivision Control process. The Town also does have a Stormwater Bylaw that outlines procedural requirements and was adopted under the 2003 MS4 Permit.

**BMP: Site Inspection and Enforcement of Erosion and Sediment Control (ESC) Measures**

**Description:** Develop written site inspection and enforcement procedures.

**Responsible Department/Parties:** Planning Board, Building Department, Conservation Commission/DCR

**Measurable Goals:** Continue to enforce erosion and sediment control measures and report on the number of site plan reviews, inspections and enforcements that occur annually.

**Implementation Timeframe:** Completed during Permit Year 4 (FY2022). The Standard Operating Procedure (SOP) for site plan review, inspection, and enforcement has been appended to the SWMP in Appendix H.

**BMP: Site Plan Review**

**Description:** Develop written procedures for site plan review and begin implementation.

**Responsible Department/Parties:** Planning Board, Conservation Commission

**Measurable Goals:** Implement site plan review procedures and report on the number of site plans reviewed annually.

**Implementation Timeframe:** Completed during Permit Year 4 (FY2022). The Standard Operating Procedure (SOP) for site plan review, inspection, and enforcement has been appended to the SWMP in Appendix H.

**BMP: Erosion and Sediment Control**

**Description:** Adoption of requirements for construction operators to implement a sediment and erosion control program.

**Responsible Department/Parties:** Planning Department, Conservation Commission

**Measurable Goals:** Continue to enforce existing sediment and erosion control requirements, and update regulations as needed.

**Implementation Timeframe:** The Town continued to enforce their existing stormwater bylaw during Permit Year 5. The Town also updated their existing Stormwater Bylaw and developed new draft Stormwater Rules & Regulations during Permit Year 5. The Town brought the updated bylaw and new Stormwater Rules & Regulations before various town boards for review during Permit Year 5. The Town hopes to formally adopt the bylaw updates and the new rules and regulations during Permit Year 6 (FY2024).

**BMP: Waste Control**

**Description:** Adoption of requirements for construction site operators to control waste, including but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes into existing stormwater regulations.

**Responsible Department/Parties:** Planning Department/ Building Department/ DPW/ Conservation Commission

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

**Implementation Timeframe:** The Town continued to enforce their existing stormwater bylaw during Permit Year 5. The Town also updated their existing Stormwater Bylaw and developed new draft Stormwater Rules & Regulations during Permit Year 5. The Town brought the updated bylaw and new Stormwater Rules & Regulations before various town boards for review during Permit Year 5. The Town hopes to formally adopt the bylaw updates and the new rules and regulations during Permit Year 6 (FY2024).

### 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:**

West Boylston’s Stormwater Bylaw currently requires development and redevelopment projects to meet the requirements of the Massachusetts Stormwater Management Policy, which is an outdated reference document. The Town has expressed interest in reviewing and identifying any gaps in the current Subdivision, Zoning, and General Bylaws as they pertain to stormwater management. To accomplish this and meet the requirements of the 2016 MS4 Permit, the Town shall implement the following BMPs:

#### **BMP: As-Built Plans for On-site Stormwater Control**

**Description:** Develop stormwater rules and regulations to require that stormwater management systems be shown on as-built drawings and to require long-term operation and maintenance plans for the stormwater management system.

**Responsible Department/Parties:** Planning Department/ Building Department/ Conservation Commission

**Measurable Goals:** Require submission of as-built plans and long-term O&M plans for completed projects within two years of construction completion. Update existing regulations as needed within two years of the permit effective date.

**Implementation Timeframe:** The Town continued to enforce their existing Stormwater Bylaw during Permit Year 5. During Permit Year 5, the Town continued to update their existing Stormwater Bylaw and continued to develop draft Stormwater Rules & Regulations. During Permit Year 5, the Town, and the Town’s MS4 consultant, Weston & Sampson, went before various Boards and Commissions to present the updated Stormwater Bylaw and the new Stormwater Rules & Regulations. The Town presented the updated Stormwater Bylaw and the new Stormwater Rules & Regulations to the Conservation Commission on February 6, 2023 and March 6, 2023; to the Planning Board on



February 8, 2023 and March 8, 2023; and the Select Board on April 5, 2023. The Town is currently working to incorporate feedback received from these Boards and Commissions. The Town anticipates adoption of the updated Stormwater Bylaw and the new Stormwater Rules & Regulations during Permit Year 6 (FY2024).

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

**Description:** Identify at least five (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:** Planning Department, Building Department, Conservation Commission, DPW

**Measurable Goals:** This goal can be achieved through disconnection of impervious surfaces, by introducing low impact development and green infrastructure practices, or re-defining zoning regulations to change maximum sizes of parking lots and lane widths. Report annually on progress and retrofitted properties targeted by this effort.

**Implementation Timeframe:** Completed during Permit Year 4 (FY2022) and the number of properties identified will be reported on annually, to maintain at least 5 retrofits in the Town's inventory for the duration of the permit. The BMP Retrofit Inventory Report has been appended to this SWMP in Appendix K.

**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:** Planning Department, Conservation Commission, DPW

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

**Implementation Timeframe:** Assessment completed during Permit Year 4 (FY2022). Recommendations to be implemented in future permit years. The Green Infrastructure Report has been appended to this SWMP in Appendix K.

**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:** Planning Department, Building Department

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

**Implementation Timeframe:** Assessment completed during Permit Year 4 (FY2022). Recommendations to be implemented in future permit years. The Street Design and Parking Lot Report has been appended to this SWMP in Appendix K.

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

**Description:** Review and update, as needed, the Town's Stormwater Management Bylaw to include Post-Construction Stormwater Management requirements of the 2016 MS4 Permit to ensure that 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. The Town's existing Stormwater Bylaw requires development and redevelopment projects to meet the requirements of the Massachusetts Stormwater Policy. This

reference is outdated and needs updating. Supporting Rules & Regulations are being developed to consolidate all the Town's regulatory language relating to stormwater management on new development and redevelopment projects into one document.

**Responsible Department/Parties:** Planning Department, DPW

**Measurable Goals:** Review the Town's existing regulatory language and update as needed.

**Implementation Timeframe:** The Town continued to enforce their existing Stormwater Bylaw during Permit Year 5. During Permit Year 5, the Town continued to update their existing Stormwater Bylaw and continued to develop draft Stormwater Rules & Regulations. During Permit Year 5, the Town, and the Town's MS4 consultant, Weston & Sampson, went before various Boards and Commissions to present the updated Stormwater Bylaw and the new Stormwater Rules & Regulations. The Town presented the updated Stormwater Bylaw and the new Stormwater Rules & Regulations to the Conservation Commission on February 6, 2023 and March 6, 2023; to the Planning Board on February 8, 2023 and March 8, 2023; and the Select Board on April 5, 2023. The Town is currently working to incorporate feedback received from these Boards and Commissions. The Town anticipates adoption of the updated Stormwater Bylaw and the new Stormwater Rules & Regulations during Permit Year 6 (FY2024).

### 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:**

West Boylston regularly performs some operation and maintenance tasks related to overall stormwater management, including annual street sweeping of most public roadways and parking lots of town-owned properties, and annual catch basin cleaning. The requirements of the 2016 MS4 Permit will be achieved through implementation of the following BMPs:

#### **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, 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:** Planning Board, Conservation Commission, DPW

**Measurable Goals:** Create and implement standard operation and maintenance procedures for all municipal activities and facilities.

**Implementation Timeframe:** Completed during Permit Year 4 (FY2022).

#### **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

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

**Implementation Timeframe:** Completed during Permit Year 4 (FY2022) and to be updated annually.

**BMP: Infrastructure O&M**

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

**Responsible Department/Parties:** DPW

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

**Implementation Timeframe:** Completed during Permit Year 4 (FY2022).

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

**Description:** Create SWPPPs for all waste handling facilities, including the West Boylston DPW and the Mount Vernon Cemetery.

**Responsible Department/Parties:** Conservation Commission, DPW

**Measurable Goals:** Complete plans and implement within 2 years of the permit effective date. Complete inspections on a quarterly basis and training annually in accordance with permit conditions. Track number of employees trained annually.

**Implementation Timeframe:** Completed during Permit Year 4 (FY2022) and continued with annual training and quarterly inspections during Permit Year 5.

**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 that schedule.

**Responsible Department/Parties:** DPW

**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.

**Implementation Timeframe:** Catch basins inspected, cleaned and reported on annually beginning in Permit Year 1 (FY2019).

**BMP: Street Sweeping Program**

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

**Responsible Department/Parties:** DPW

**Measurable Goals:** Sweep all streets and permittee-owned parking lots once per year in the spring. Sweep selected streets a second time in the fall to meet requirements specific to impaired waters. Track miles of roadway swept, or volume or mass of sediment removed.

**Implementation Timeframe:** Streets and parking lots swept once annually, and miles of roadway swept recorded beginning on Permit Year 1 (FY2019). The Town developed written procedures for sweeping streets and municipally-owned lots during Permit Year 4 (FY2022).

**BMP: Road Salt Use Optimization Program**

**Description:** Develop and implement a program to minimize the use of road salts and continue the ongoing calibration of salt trucks.

**Responsible Department/Parties:** DPW

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

**Implementation Timeframe:** Completed during Permit Year 4 (FY2022). The Town developed a written Standard Operating Procedure for Winter Road Maintenance, which includes a Road Salt Use Optimization Program. This SOP is included in Appendix I.

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

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

**Responsible Department/Parties:** DPW

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

**Implementation Timeframe:** Annual inspection and maintenance of treatment structures began in Permit Year 4 after the inventory of municipally-owned stormwater treatment structures was completed during Permit Year 4 (FY2022). Written inspection and maintenance procedures were developed during Permit Year 4 (FY2022) as part of creating standard operating procedures for infrastructure operation & maintenance. Inspection of treatment structures was also completed during Permit Year 5.

**BMP: Employee Training – General Stormwater Topics**

**Description:** Send Public Works employees annually to training sessions sponsored by MassDOT, Baystate Roads, and other relevant vendors.

**Responsible Department/Parties:** DPW

**Measurable Goals:** Continue to implement and track number of employees sent to training sessions.

**Implementation Timeframe:** Completed and implemented during Permit Year 4 (FY2022). The Town continued to send employees to training sessions as opportunities arise during Permit Year 5.

**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

**Measurable Goals:** Complete within 2 years of permit effective date.

**Implementation Timeframe:** Written catch basin cleaning optimization plan to be completed and implemented once sufficient catch basin inspection and cleaning data has been collected. It is anticipated that the plan will be developed in Permit Year 6.

### 3.0 REGULATORY STANDARDS

#### 3.1 Introduction

To prevent pollutants from entering the drainage system and being discharged to the environment with stormwater, West Boylston 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 measures for Illicit Discharge Detection and Elimination, Construction Site Stormwater Runoff Control, and Post-Construction Stormwater Management are focused on improving stormwater pollution prevention into the future through implementation of the following:

- 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 and enacted a Stormwater Bylaw to comply with the permit, and updated their existing regulations, as needed, to improve stormwater management town wide.

##### 3.2.1 Stormwater Bylaw

The 2003 MS4 Permit required the Town to develop, implement and enforce a program to address stormwater runoff from construction activities, as well as new development and redevelopment projects, 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.

*Stormwater Bylaw*, of West Boylston's Bylaws was adopted on October 15, 2007. The objectives of this bylaw are to:

1. Establish regulations for land development activities that preserve the health of water resources;
2. Require that the quantity and quality of stormwater discharging from new development both during and after construction maintains or improves these characteristics compared to pre-development conditions in order to reduce flooding, stream erosion, pollution, property damage and harm to aquatic life;
3. Establish stormwater management standards and design criteria to control the quantity and quality of stormwater runoff;

4. Encourage the use of “low impact development practices”, such as reducing impervious cover and preserving greenspace and other natural areas;
5. Establish maintenance provisions to ensure that stormwater treatment practices will continue to function as designed and pose no threat to public safety;
6. Establish procedures for the Town’s review and enforcement of stormwater management plans and for the Town’s inspection of approved stormwater treatment practices.

This bylaw requires that a stormwater management permit is obtained for development and redevelopment projects; including, but not limited to:

1. Site plan applications and subdivision applications;
2. Any activities that will result in an increased amount of stormwater runoff or pollutants from a parcel or land, or that will alter the drainage characteristics of a parcel of land (unless exempt);
3. An alteration, redevelopment, or conversion of land use to a “hotspot” including, but not limited to, auto salvage yards, auto fueling facilities, fleet storage yards, commercial parking lots with high intensity use, road salt storage areas, commercial nurseries and landscaping, outdoor storage and loading areas of hazardous substances, or marinas.

Exceptions include:

1. Any activity that will disturb an area less than 10,000 (gross) square feet of all contiguous properties;
2. Normal maintenance and improvement of land in agricultural use as defined by the Wetlands Protection Act regulation 310 CMR 10.04 and MGL Chapter 40A Section3;
3. Maintenance of existing landscaping, gardens or lawn areas associated with a single, two, or three family dwelling;
4. Repair or replacement of an existing roof;
5. Construction of a single-family dwelling, where approval is not required as defined in the Subdivision Control Law, unless the associated land disturbance activity exceeds 10,000 (gross) square feet. Prior to land disturbance activities, persons constructing single-family dwellings are strongly encouraged to consult with the town’s Stormwater Authority about actions to reduce stormwater impacts during and after construction. It is also recommended that individuals constructing single-family dwellings prepare and grade lots in such a manner that development of the lot does not cause detrimental drainage on another lot or onto streets either during construction or upon completion.
6. Repair or replacement of an existing septic system when approved by the Board of Health. Persons repairing or replacing septic systems are strongly encouraged to consult with the Town of West Boylston Board of Health or Conservation Commission about actions to reduce stormwater impacts during and after construction.
7. The construction of any fence that will not alter existing terrain or drainage patterns;
8. Construction of a deck, patio, retaining wall, expansion of an existing driveway, construction of a shed, garage, swimming pool, tennis or basketball court associated with a single, two, or three family dwelling that does not disturb more than 10,000 square feet.
9. Construction of utilities (gas, water, electric, telephone, etc.) other than drainage, which will not alter terrain, ground cover, or drainage patterns and for which the total area to be disturbed (even if linear in nature) does not exceed 10,000 sq. ft. at one time, defined as more than one week of exposed surface area;

- 10. Emergency repairs to any stormwater management facility or drainage structure or practice that poses a threat to public health or safety, or as deemed necessary by the Stormwater Authority; and
- 11. Any work or projects for which all necessary approvals and permits have been issued before the effective date of this Bylaw.
- 12. Normal maintenance of Town owned public land, ways, and appurtenances.

A copy of this bylaw is included in Appendix H.

*3.2.2 Rules and Regulations Governing the Subdivision of Land*

The Town of West Boylston’s Rules and Regulations Governing the Subdivision of Land are administered by the Planning Board. The regulations outline stormwater management design standards, as well as erosion and sediment control requirements. The Definitive Plan requires existing and proposed drainage systems within or in the vicinity of the proposed subdivision be shown and accompanied by drainage calculations stamped and signed by a professional engineer, as well as a completed and stamped Stormwater Management Form to verify compliance with all the Stormwater Management Standards itemized by the Department of Environmental Protection for all proposed development. The Definitive Plan also requires the development of an Erosion and Sediment Control Plan that includes description, phasing and sequencing of construction activities, temporary and permanent soil erosion and sediment control measures, and temporary and permanent seeding and other vegetative controls.

A copy of these regulations is included in Appendix H.

**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, 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 West Boylston’s Regulations that Support Permit Requirement:

West Boylston’s *Rules and Regulations Governing the Subdivision of Land* details inspection and enforcement procedures for Definitive Plans in Section 8.D, *Supervision and Inspection*, which states:

.....

1. "All work performed as pursuant to these Rules and Regulations shall be subject to review of the Planning Board, which shall approve and accept, or disapprove and reject, each phase or portion of such work. The Planning Board may employ a registered professional engineer or other qualified agent to act to inspect the work to ensure that it is performed in accordance with good engineering practice and with all applicable specifications, to ensure compliance with these Rules and Regulations, and to report to the Board any recommendations as to approval or disapproval of the work. Such agent will make certain inspections as prescribed in this subsection in order to check the adequacy of the work at various stages prior to such work being covered by subsequent work. However, the Planning Board, its Agent or Consultant Engineer shall also have the right to inspect work at any time.
2. After approval of the Definitive Plan, the Board will notify the Applicant of the name and address of the Planning Board Agent or Consultant Engineer designated as its representative to perform inspections, as required herein and otherwise, as the Board's agent to ensure compliance with these Rules and Regulations. The Applicant shall keep the Planning Board and its Agent or Consultant Engineer fully informed as to the status and progress of the work.
3. The Applicant shall provide safe and convenient access to all parts of the subdivision for the purposes of inspection to representatives of the Planning Board or other Town agencies or boards or the Planning Board Agent or Consultant Engineer. No work will be accepted that has been covered before such inspection. The Applicant shall notify the engineer directly (by mail or in person by telephone) and shall thereafter file a written statement with the Planning Board including the date and time of such notification and the person notified at least 48 hours in advance that the work has progressed to a stage that an inspection is required. The Planning Board Agent or Consultant Engineer will inspect the work in progress during reasonable hours, as the Construction Inspector will see fit; but in any case, it will be the Applicant's responsibility to request his inspection at the following progress steps:
  - a. After excavation and/or filling has been completed, but before the gravel placement operation is started. The purpose of this inspection is to ensure that the correct materials have been used and ensure that the site has been prepared in a proper manner;
  - b. After the drainage system (pipe, manholes, catch basins and other drainage structures) is installed, but before it is covered. The inspector shall enter each catch basin to sight drainage pipe runs to adjacent basins. Any defective runs shall be corrected before approval is given. The purpose of this inspection is to ensure that the lines have been installed correctly;
  - c. After surface gravel is in and compacted, but before bituminous surface treatment is applied. The inspector shall also inspect pipe runs from catch basins, as above; field tests and observation will be conducted to ensure correct placement of fill and compaction;
  - d. After bituminous concrete and curbing, if required, are installed, to ensure correct construction of pavement, curb, and sidewalk including in-place thickness measurements, temperature measurements at the time of placement, and density test after rolling; and
  - e. Before acceptance by the Town of West Boylston to ensure the installation of grass plots, street signs, monuments and of cleaning up.



The Director of the Department of Public Works may inspect the work at his discretion, reporting any deficiencies to the Planning Board or the Consultant Engineer retained by the Planning Board. The Applicant must furnish all data relative to baselines and grade stakes on the ground, stake sheets, ties and any other information that is needed in the opinion of the Planning Board or those designated by the Planning Board to accomplish such checking as is required for the requested approval and certification.”

*Zoning Bylaws Section 3.6, Site Plan Review*, outlines the projects that require site plan review, the procedure for the site plan review process, site plan contents, submission materials, standards, and enforcement procedures.

Section 3.6.I, *Enforcement*, states the following:

1. “It shall be the duty of the Building Inspector to administer and enforce the provisions of this by-law.
2. The Planning Board shall provide a schedule of inspection fees to be paid by the applicant prior to the start of construction.
3. The Planning Board may use inspection fees paid by the applicant to offset the cost of hiring any additional engineers or inspectors necessary to monitor all phases of construction covered by an approved site plan.
4. The Planning Board may suspend its site plan approval when work is not performed as required by the approved site plan.
5. “As Built” plans, certified by a registered professional and noting any change from the approved plan, shall be filed with the Building Inspector and the Planning Board before a Certificate of Completion shall be issued.
6. The Building Inspector shall issue a Certificate of Completion when all construction has been performed and all other requirements have been met in compliance with the approved site plan. A copy of the Certificate of Completion will be filed with the Planning Board. pg. 42 Amended May 17, 2021 ATM
7. No Certificate of Occupancy shall be issued for any structure or use subject to site plan review unless a Certificate of Completion has been issued.
8. The Building Inspector may issue a Temporary Certificate of Occupancy for a period of one (1) year if the required construction has been substantially completed and the permitted uses of the development can be carried on in a safe and convenient manner.
9. Any person aggrieved by any decision of the Planning Board or Building Inspector regarding a site plan review application may appeal that decision to the Zoning Board of Appeals as provided in Article 6.2 of this by-law.”

Recommended Modifications: Create a Standard Operating Procedure (SOP) to outline the responsibilities and process for performing inspections on a site with explicit language outlining the inspection and enforcement procedures for erosion and sediment control during and after construction.

Updates Completed to Meet Permit Requirement: The Town has adopted Standard Operating Procedures (SOP) for inspection of construction sites, including sediment and erosion control measures, as developed by the Central Massachusetts Regional Stormwater Coalition. This SOP and the accompanying checklist can be found in Appendix H.

## 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 West Boylston's Regulations that Support Permit Requirement

West Boylston's Stormwater Bylaw states that "The Stormwater Authority will utilize the policy, criteria and information including specifications and standards of the latest edition of the Massachusetts Stormwater Management Policy (see Appendix B), to execute the provisions of this Bylaw. This Policy includes a list of acceptable stormwater treatment practices, including the specific design criteria for each."

An Erosion and Sediment Control Plan is referenced in the Subdivision Rules and Regulations as it is required in the Definitive Plan submission. Section 6.E, *Storm Water Management*, states that "Storm drains, culverts, and related installations, both surface and sub-surface, shall be designed to provide for safe unimpeded flow of natural water courses, drainage of low area along streets and to intercept water runoff along streets at intervals reasonably related to the extent, surface type and grade of the area drained. Certification is required for all developments that the design meets the Stormwater Management Standards specified by DEP in the Massachusetts Stormwater Guidance (no exemptions for smaller projects), as amended. Proper connection shall be provided to the existing drainage system and drains shall be extended to adjacent lands so as to provide for their future continuation. Drainage depending on flow over streets or land outside subdivision shall not be approved unless appropriate easements are first obtained. The minimum drain pipe size shall be 12" and the design velocity of flow shall be no lower than 2.5 feet per second and shall be 3 feet per second where obtainable. Maximum design velocity of flow shall be 15 feet per second.

Catch basins shall be located on both sides of the roadway not more than 250 feet apart as necessary for proper interception of water runoff. Catch basins shall not be located at driveway openings. Culverts shall be designed to accommodate a 50-year frequency storm: underground storm drains, catch basins and related installations shall be designed to accommodate a 10-year frequency storm. The 100-year storm shall also be assessed for its impacts on the proposed subdivision, adjacent and downstream properties.

Provisions may be made to construct vegetated open channels in lieu of traditional curbs and gutters, where, in the opinion of the Planning Board, it is appropriate and reasonable. Vegetated

open channels may consist of grass channels or dry swales. Grass channels are most appropriate for smaller drainage areas, mildly sloping topography, and housing density less than four (4) dwelling units per acre. Dry swales are most appropriate for high density areas. The Applicant may propose an open or “country drainage” system consisting of drainage swales or surface ditches to convey stormwater runoff from road and driveway surfaces. Such a system will only be considered on residential streets with less than 3% slope and generally permeable soils. The Applicant must submit drainage and hydrologic calculations to demonstrate the system can accommodate a 10-year storm. The 100-year storm shall also be assessed for its impacts on the proposed subdivision and adjacent and downstream properties to demonstrate there will not be unacceptable flooding conditions. Adequate drainage shall be designed to manage the surface and subsurface water of the roadway and adjoining land. Street drainage designs shall be of the type known as a “manhole system” unless an open system is proposed. The “manhole system” is one in which the water collected in the catch basins empty into an intermediate manhole in a main drain laid in the street.

The main drain shall also have additional manholes installed at points where changes in direction or grade make such manholes necessary to ensure an uninterrupted flow of water to its final outlet. If it is felt that a variation or modification of the required drainage system is advisable, then the subdivider shall present such varied or modified design to the Planning Board for its adjudication. The design shall include the size, quality, and type of pipe; inlets, manholes, stormwater treatment and detention areas; and the percent of grade. All necessary drains or roadway or subsurface water, which is otherwise not taken care of, shall be drawn in a manner approved by the Planning Board. The applicable design criterion shall be no increase in the peak rate of runoff for the 10-year 24-hour storm, and the 100-year 24-hour storm shall be assessed to determine that there will be no adverse impact on the proposed subdivision or adjacent and downstream properties. Where water is to be ponded to a depth greater than two (2) feet, a four-foot fence or barrier is to be used to limit access. A twelve (12) foot gate and road is to be included to allow access for maintenance.

No stormwater appurtenances that service the proposed subdivision will be located outside of the Subdivision boundaries.

Ownership and responsibility for maintenance of all drainage structures located outside of the right of way (e.g., detention/retention basins, headwalls, swales, etc.) shall become the responsibility of the property owners within the subdivision. Ownership and responsibility for maintenance of those structures shall be deeded to a Homeowner’s Association as defined in Section V. H. The town of West Boylston will not accept ownership nor responsibility for maintenance of said structures.

The use of Low Impact Development methods is encouraged.”

Section 6.F, *Protection of Local Water Supply*, states that “All proposed storm water management systems must provide for maintaining existing storm flow rates from the site under the developed condition. In addition, no direct discharges of stormwater to wetland resource areas or waterways will be permitted without treatment prior to discharge. Stormwater systems should be designed to reduce suspended solids by a minimum of 80% to prevent pollution from reaching off-site areas and degrading water quality. To achieve these reductions in pollutant loads the Stormwater Best Management Practices (BMP) adopted by the Department of Environmental Protection (DEP), including those cited in the DEP Stormwater Management Policy Guidance (1996), shall be followed for all developments. The use of Low Impact Development (LID) practices is

encouraged. Additional information regarding LID is available on the Massachusetts State Website. Other sources of BMP and techniques are detailed in the USEPA Guidance for Construction Site Stormwater Management (1992) and the Massachusetts Nonpoint Source Management Manual (1993) as amended.”

Section 6.L, *Erosion and Sediment Control*, of the Town’s Subdivision Rules and Regulations states the following:

1. “The purpose of this section of these Rules and Regulations is to eliminate or reduce the harmful impacts of soil erosion and sedimentation on the public health, safety and welfare and the environment by prohibiting increases in sediment-laden runoff from land-disturbing activities and by prohibiting streambank erosion along bodies of water. This section sets forth activities with potential for such impacts and requiring review and approval as part of the Subdivision Control process for activities above thresholds of jurisdiction under this section. By implementing the controls in this section such erosion and sediment will be controlled to protect water quality, flood storage, stream flow, wildlife habitat, aquatic resources and public safety.
2. No person shall clear, cut, or do any land-disturbing activity on an area of land pursuant to a Definitive Plan approval pursuant to these Rules and Regulations unless such land disturbance has been specifically approved by the Planning Board put to this Section. In order to obtain such approval, the Applicant shall submit, together with the Definitive Plan:
  - a. A description, phasing, and sequencing of construction activities, which specifies the expected date of soil stabilization and completion;
  - b. Temporary and permanent soil erosion and sediment control measures;
  - c. Temporary and permanent seeding and other vegetative controls.
3. The Applicant shall have a Certified Professional in Erosion and Sediment Control or Registered Engineer prepare detailed erosion and sediment control plans for approval by the Planning Board, which may include:
  - a. Detailed location, elevation, and cross-section of any dam or basin with drainage calculations to justify basin sizing;
  - b. Plan view of any dam or basin;
  - c. Spillway and outlet control designs showing calculations and profiles;
  - d. Emergency spillway and outlet control designs showing calculations, profiles, and cross-sections;
  - e. Runoff calculations for peak runoff during a 100-year storm;
  - f. Notes and construction specifications;
  - g. Type of device;
  - h. Drainage area to any device;
  - i. Volume of storage required;
  - j. Outlet control mechanism details;
  - k. Storage depth below an outlet or clean-out elevation;
  - l. Embankment height, slope, cross-sections, and elevation;
  - m. If required by the Planning Board, a portable safety fence may be required surrounding any basin or trap, not less than 42 inches in height with openings not more than three inches in diameter, firmly anchored at spacing no greater than eight feet. Detailed plans should be submitted where appropriate.
4. Vegetative stabilization measures will be employed. All perimeter dikes, slopes, basin or trap embankments will be stabilized with sod, hydroseed, and/or straw mulch (anchored on

disturbed slopes greater than 15%), within 7 calendar days of disturbance. All other disturbed areas will be stabilized with sod, hydroseed, and/or straw mulch, (anchored on slopes greater than 15%), within 14 calendar days after disturbing activities have ceased. The applicant shall submit a plan depicting where topsoil will be stripped from areas to be disturbed and stockpiled in an approved area and stabilized with temporary vegetative cover if left more than 21 calendar days. Perimeter sediment controls will be installed around stockpiled topsoil. During the months of October through March, when seeding and sodding may be impractical, an anchored mulch will be applied as approved by the Board.

5. During construction, all catch basins shall be provided with siltation controls and maintained to minimize the amount of silt that enters the drainage system."

The Model Operation and Maintenance Plan section of the Subdivision Rules and Regulations provides recommendations for construction site erosion and sedimentation control techniques, and references that a Stormwater Pollution Prevention Plan must be implemented by the contractor in compliance with EPA NPDES regulations.

Recommended Modifications: Update the Stormwater Bylaw and Subdivision Rules and Regulations to reference the Massachusetts Stormwater Handbook and Stormwater Standards.

### 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 West Boylston's Regulations that Support Permit Requirement: The Town's Stormwater Bylaw and Subdivision Rules and Regulations do not reference the control of wastes.

Recommended Modifications: Add language to the Town's Stormwater Bylaw to indicate that "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.*

Excerpts from West Boylston's Regulations that Support Permit Requirement: West Boylston's site plan review standards and enforcement procedures are included in the *Zoning Bylaws*. Section 3.6.D, *Site Plan Contents and Submission Materials*, states that "The applicant shall submit such material as may be required to ensure the proposed development will not pollute surface or ground water, cause soil erosion, increase runoff, change ground water levels, nor increase flooding during or after construction."

*Zoning Bylaws* Section 3.6.E, *Site Design Standards*, states that "All site plan applicants must submit drainage calculations to show compliance with DEP (Department of Environmental Protection) Stormwater Guidelines."

Section 5, Definitive Plans, of West Boylston's *Rules and Regulations Governing the Subdivision of Land* outlines the Definitive Plan inspection and enforcement procedures in Section 8.D, *Supervision and Inspection*. A public hearing is required for the approval of a definitive plan.

The Town has developed a SOP that incorporates the items identified herein and outlines the Town's internal Site Plan Review Procedures.

### 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.*

Excerpts from West Boylston's Regulations that Support Permit Requirement: The Town's Stormwater Bylaw states that one of the objectives of the bylaw is to "Encourage the use of 'low impact development practices', such as reducing impervious cover and preserving greenspace and other natural areas."

Also, the Town's Subdivision Rules and Regulations state in Section 6, *Design Standards*, that "Low Impact Development will be implemented where possible".

Recommended Modification: Though LID is encouraged, the Town may want to consider revising the existing language in their Stormwater Bylaw, Zoning Bylaws and Subdivision Regulations to indicate that implementation of low impact design strategies is required to the maximum extent feasible and consider requiring that applicants specifically outline LID practices employed on site or indicate why LID practices are not feasible at the site. As an alternative, the information could also be added to the Town's Stormwater Bylaw assuming it is made to be applicable to all types of development, including subdivisions.

## 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.

Excerpts from West Boylston's Regulations that Support Permit Requirement: The Stormwater Bylaw states that "The Stormwater Authority will utilize the policy, criteria and information including specifications and standards of the latest edition of the Massachusetts Stormwater Management Policy (see Appendix B), to execute provisions of this Bylaw. This Policy includes a list of acceptable stormwater treatment practices, including the specific design criteria for each."

Section 3.6E of the Zoning Bylaws states that "All site plan applicants must submit drainage calculations to show compliance with DEP (Department of Environmental Protection) Stormwater Guidelines."

In addition, Section 6.E of the Subdivision Rules and Regulations states that "Certification is required for all developments that the design meets the Stormwater Management Standards specified by DEP in the Massachusetts Stormwater Guidance (no exemptions for smaller projects), as amended."

Recommended Modifications: Outdated references to the Stormwater Management Policy and DEP Guidelines should be updated in the Stormwater Bylaw, the Zoning Bylaws and the Subdivision Rules and Regulations to reference the Stormwater Handbook and the latest Stormwater Management Standards.

## 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.*

Excerpts from West Boylston's Regulations that Support Permit Requirement: In the Town's Subdivision Rules and Regulations, Section 6.F, *Protection of Local Water Supply*, states that "All proposed storm water management systems must provide for maintaining existing storm flow rates from the site under the developed condition. In addition, no direct discharges of stormwater to wetland resource areas or waterways will be permitted without treatment prior to discharge. Stormwater systems should be designed to reduce suspended solids by a minimum of 80% to prevent pollution from reaching off-site areas and degrading water quality. To achieve these reductions in pollutant loads the Stormwater Best Management Practices (BMP) adopted by the Department of Environmental Protection (DEP), including those cited in the DEP Stormwater Management Policy Guidance (1996), shall be followed for all developments."

The Town's Zoning Bylaws and Stormwater Bylaw do not explicitly state stormwater management system design requirements for new development.

Recommended Modifications: References to the Stormwater Management Policy and DEP Guidelines should be updated in the Stormwater Bylaw, the Zoning Bylaws and the Subdivision Rules and Regulations to reference the Stormwater Handbook and the latest Stormwater Management Standards. In addition, the following requirements shall be incorporated into all documents:

"For new development, stormwater management systems must be designed to:

- (a) 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
- (b) Remove 90% of the average annual post-construction load of Total Suspended Solids (TSS) generated from the total post-construction impervious area on the site AND 60% 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.



### 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.

Excerpts from West Boylston's Regulations that Support Permit Requirement: The Town's Stormwater Bylaw, Zoning Bylaws, and Subdivision Rules and Regulations do not explicitly state stormwater management system design standards for redevelopment projects.

Recommended Modifications: References to the Stormwater Management Policy and DEP Guidelines should be updated in the Stormwater Bylaw, the Zoning Bylaws and the Subdivision Rules and Regulations to reference the Stormwater Handbook and the latest Stormwater Management Standards. In addition, the following requirements shall be incorporated into all documents:

"For redevelopment, stormwater management systems must be designed to:

- (a) 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
- (b) 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."

There is no reference to USGS HUC10 in any current town language. It must be added to the Stormwater Bylaw, as indicated below:

"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."

*Permit Requirement: 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 any of the parts listed previously above. 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 listed above fully.*

Excerpts from West Boylston's Regulations that Support Permit Requirement: Exceptions to the Town's Stormwater Bylaw include "Normal maintenance of Town owned public land, ways, and appurtenances."

Recommended Modifications: References to the Stormwater Management Policy and DEP Guidelines should be updated in the Stormwater Bylaw, the Zoning Bylaws and the Subdivision Rules and Regulations to reference the Stormwater Handbook and the latest Stormwater Management Standards. In addition, the exemptions to the Stormwater Bylaw should be updated to state that "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 the Stormwater Bylaw. 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 listed in the Stormwater Bylaw."

### 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).*

Excerpts from West Boylston's Regulations that Support Permit Requirement: Section 3.6.I, Enforcement, of West Boylston's Zoning Bylaws, requires "'As-built' plans, certified by a registered professional and noting any change from the approved plan, shall be filed with the Building Inspector and Planning Board before a Certificate of Completion shall be issued."

Section 8.F, Release of Bonds, of West Boylston's Subdivision Rules and Regulations states that "Before the Planning Board shall give final approval and release any covenants and/or bonds required for the construction of the improvements shown on the approved subdivision plan, the Applicant shall furnish the Planning Board, within five (5) years from the date of the final approval of the Definitive Plan, final 'as built' plans demonstrating compliance with the Record Plan for the subdivision."

Recommended Modification: West Boylston's Zoning Bylaws and Subdivision Rules and Regulations should be updated to require that as-built drawings are submitted no later than two years after completion of construction projects, and that the as-built drawings must show all structural and non-structural stormwater controls associated with the completed site. The Stormwater Bylaw should be revised to state that as-builts shall be required at completion of the project in accordance with the Town's Subdivision Rules and Regulations and Zoning Bylaws.

### 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.*

Excerpts from West Boylston's Regulations that Support Permit Requirement: Operation and maintenance plans are required for applicants of a Definitive Plan in the Town's Subdivision Rules and Regulations. Section 5.B, Form and Content of the Definitive Plan, states that "All Definitive Plan submissions shall include a plan, with a narrative, for operation and maintenance of the subdivision right-of-ways, easements and roads for the time prior to acceptance by the Town. The maintenance is the responsibility of the owner until the roadway is accepted at Town Meeting. The maintenance plan should include provision for the maintenance of road pavement, soil settling problems, street sweeping, snowplowing, maintaining vegetative stabilization of all right-of-ways and easements, erosion controls, fall leaf cleanup, catch basins, detention basins, drainage system cleaning, and other provisions as determined to be necessary by the Planning Board."

Additionally, the Planning Board requires the following after construction is completed, before making a recommendation to Town Meeting on whether the road or way in a subdivision should be accepted:

“A typewritten plan for maintenance of the subdivision drainage system, right-of-ways, easements and roads for a 20-year period. The maintenance plan should include responsible parties and specific provisions for the maintenance of road pavement, soil settling problems, street sweeping, snowplowing, maintaining vegetative stabilization of all rights-of-way and easements, erosion controls, fall leaf cleanup, catch basins, detention basins, and drainage system cleaning and maintenance, and other provisions as determined to be necessary by the Planning Board. If the street is accepted by the Town, the town will not accept ownership of, or be responsible for maintenance of, any drainage beyond the road right of way, which shall be and remain in perpetuity the responsibility of the Homeowners Association and/or the lot owners.”

Recommended Modification: The Stormwater Rules and Regulations currently being developed by the Town should include requirements for the long-term operation and maintenance of stormwater treatment structures.

### Chloride Impairment

Permit Requirement: *The Town must 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.*

Recommended Modification: The Draft Stormwater Rules and Regulations currently being developed by the Town include measures to prevent erosion of any salt stockpiles to precipitation and runoff at all commercial and industrial properties within the regulated area. It is anticipated that these Stormwater Rules & Regulations will be formally adopted during Permit Year 6.

## 4.0 IDDE MONITORING AND PROGRESS

### 4.1 IDDE Plan

During Permit Year 5, the Town of West Boylston continued development of a new bylaw governing discharges to the drainage system. This bylaw, which governs discharges to the Municipal Separate Storm Sewer System, prohibits illicit discharges and connections to the municipal storm drain system. The draft bylaw was presented to the Conservation Commission on February 6, 2023; the Planning Board on February 8, 2023; and the Select Board on April 5, 2023. The West Boylston Department of Public Works will have the authority to administer, implement and enforce this bylaw. A copy of this bylaw will be provided in Appendix C upon adoption. This bylaw will provide the Town of West Boylston with adequate legal authority to accomplish the following:

- Prohibit illicit discharges.
- Investigate suspected illicit discharges.
- Eliminate illicit discharges, including discharges from properties not owned by or controlled by West Boylston that discharge into the MS4 system.
- Implement appropriate enforcement procedures and actions.

However, the Town's existing Sewer Use Regulations under Article 2, Use of Public Sewers Required, indicate that "it shall be unlawful to discharge directly to any natural outlet within the Town of West Boylston, or in any area under jurisdiction of said Town, any wastewater or other polluted water, without the applicable state and federal discharge permits. A Natural Outlet is defined in the regulations as any outlet, including storm sewers into a watercourse, pond, ditch, lake, or other body of surface or groundwater. Article 8 outlines Powers and Authority of Inspectors to enter private property to perform inspections and conduct testing. Article 9 outlines Penalties. Applicable excerpts from these regulations are included in Appendix C.

Under the 2016 MS4 Permit, the Town is required to implement their Illicit Discharge Detection and Elimination Investigation Program by presenting a defined approach to investigate, identify, and remove illicit connections. The Town was required to develop the written plan in Year 1 and then continue to implement the plan throughout the permit term.

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.

West Boylston 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 and cross connections between the sanitary and drainage infrastructure, in addition to all isolated or recurring discharges such as illegal dumping and improper disposal of waste from boats. Illicit Discharges could also be indirect sources that infiltrate into the drainage system through cracks/defects in infrastructure, such as sanitary wastes from failing sewer pipes. 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 developed a comprehensive map of their drainage system, which includes outfalls, pipes, manholes, catch basins, interconnections with other MS4s, municipally owned stormwater treatment structures and impaired water bodies. Outfalls and interconnections have been analyzed to create a defined catchment area that includes surface runoff to catch basins tributary to the identified outfall or interconnection. The catchment delineation process considered each catch basin upstream from the outfall or interconnection 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.

Drainage infrastructure under the Town's jurisdiction includes:

- Approximately 23 miles of pipe with materials of asbestos cement, cast iron, concrete, corrugated metal, ductile iron, high density polyethylene, polyvinyl chloride, reinforced concrete, reinforced plastic, and vitrified clay;
- 1,025 municipal catch basins,
- 441 municipal storm drain manholes,
- 223 municipal outfalls, and
- 8 interconnections with neighboring entities.

Mapping has been in accordance with the 2016 MS4 Permit's GPS accuracy guidelines and has been recorded on a publicly available Town map, the most recent version of which can be found at the end of this section.

West Boylston 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.

During Permit Year 5, the Town continued to update their Drainage GIS through incorporation of mapping updates identified during catchment investigations performed during Permit Year 5.

#### 4.1.2 *Catchment Prioritization and Ranking*

The Town completed an initial inventory and priority ranking to assess the illicit discharge and SSO 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
- 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 or SSOs.

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, grabs 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 of West Boylston 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.

During Permit Year 5, the Town began catchment investigations, and will continue catchment investigations during Permit Year 6.

#### 4.1.4 Sanitary Sewer Overflows

Sanitary Sewer Overflows (SSOs) are included in the MS4 Permit’s definition of illicit discharges and can be defined as discharges of untreated sanitary wastewater from a municipal sanitary sewer that can contaminate surface waters, cause serious water quality problems and property damage, and threaten public health. SSOs can be caused by blockages, line breaks, power failures, vandalism, and sewer defects. This includes 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.

West Boylston will maintain and update annually an inventory, that identifies all known locations where SSOs have discharged to the MS4 within the five (5) years prior to the effective date of the MS4 Permit (July 1, 2018), and any SSOs that have occurred thereafter. This includes SSOs resulting, during dry or wet weather, from inadequate conveyance capacities, or where interconnectivity of the storm and sanitary sewer infrastructure allows for transmission of flow between the systems. The inventory will include the following information, when available:

- Location (approximate street crossing/address and receiving water, if any);
- A clear statement of whether the discharge entered a surface water directly or entered the MS4
- Date(s) and time(s) of each known SSO occurrence (i.e., beginning and end of any known discharge);
- Estimated volume of the occurrence;
- Description of the occurrence indicating known or suspected cause(s);
- Mitigation and corrective measures completed with dates implemented; and
- Mitigation and corrective measures planned with implementation schedules.

Upon detection of an SSO, West Boylston will provide oral notice to EPA within 24 hours, a written notice to EPA within five (5) days and shall include the information in the updated inventory as



identified above and mitigate it as expeditiously as possible taking interim measures to minimize the discharge of pollutants to and from its MS4 until elimination is completed.

West Boylston has had ten (10) SSO occurrences in the five years prior to the permit effective date and since the permit became effective. The first SSO occurred on March 12, 2012 and the most recent SSO occurred on September 1, 2021. The SSOs occurred on Edgewood Drive, Woodland Street, Worcester Street, Hartwell Street, and Parker Road. The exact locations, discharge points, estimated SSO volumes, cause of overflows, and mitigation efforts completed are included in Appendix J.

The Town will maintain an SSO inventory as part of this plan and the Town's IDDE Plan. Information will also be included in the Town's MS4 Annual Reports, including the status of mitigation and corrective measures to address any identified SSOs, where applicable.

## 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

West Boylston has developed a comprehensive Operations and Maintenance (O&M) Plan to meet permit requirements. The O&M Plan is included in Appendix I of the SWMP. The inventory of municipally owned facilities and property, including vehicles, equipment, and stormwater treatment structures is included as Appendix A 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, with the exception of 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, has been incorporated into Appendix H of the Town's O&M Plan which is included in Appendix I of this Stormwater Management Plan. All required SOPs mentioned above were developed during Year 4 and are appended to the Town's O&M Plan in Appendix I.

#### 5.3.1 Infrastructure Operation and Maintenance

The Town developed its infrastructure operation and maintenance program for the stormwater system during Permit Year 4. Stormwater treatment structures were inspected in Permit Year 4, and the Town plans to clean and repair stormwater treatment structures, as needed, in the Winter of 2022/2023.

#### 5.4 Catch Basin Cleaning and Optimization

The Town currently has approximately 1,025 catch basins. The Town currently cleans their own catch basins and disposes of the accumulated sediment in accordance with state and local requirements. 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 continue to 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 began collecting catch basin cleaning inspection data during 2022 to use in developing their optimization plan to ensure that no catch basin is ever more than 50% full. The Town continued to collect additional data during the 2023 cleaning season. Data collected includes depth from the catch basin rim to the top of water, to the top of sediment, to the bottom of the basin, and to the invert of the outlet pipe. A tablet-based catch basin cleaning inspection form was developed and used so that this data can be easily 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 Discharges to Water Quality Limited Waters

Under Massachusetts General Law (MGL) Chapter 21, MassDEP is responsible for monitoring the waters of the Commonwealth, identifying those waters that are impaired, and developing a plan to bring them back into compliance with Massachusetts Surface Water Quality Standards. The list of impaired waters, better known as the "303(d) list," identifies impaired surface waters and the reasons for impairment.

Once a waterbody is identified as impaired, MassDEP is required by the Federal Clean Water Act (CWA) to develop a strategy for restoring the health of the impaired waterbody. The process of developing this strategy, which is generally referred to as a Total Maximum Daily Load (TMDL) includes identifying the type of pollutant, and the potential sources of the pollutant, in addition to determining the maximum amount of pollutant that can be discharged to a specific surface water body in order to meet surface water quality standards. Part of the TMDL also includes the development of a plan to help in meeting the Total Maximum Daily Load limits once they have been established. These impaired waters are listed under Category 4A in Part 2 of the Massachusetts Integrated List of Waters. The Wachusett Reservoir (MA81147) is impaired for mercury in fish tissue, part of the Northeast Regional Mercury TMDL.

In addition to identifying water bodies for which a Total Maximum Daily Load has already been developed, the Integrated List of Waters also identifies the 303(d) List of Impaired Waters under Category 5. The 303(d) List identifies water bodies that are impaired or threatened for one or more designated uses and require a TMDL. In West Boylston, this includes Quinapoxet River (MA81-32) which is impaired for dewatering and temperature, Poor Farm Brook (MA51-17) which is impaired for aquatic plants (macrophytes), temperature, dewatering, and E. Coli; Gates Brook (MA81-24), which is impaired for fecal coliform, chloride, and E.coli; Malden Brook (MA81-27) which is impaired for temperature, Muddy Brook (MA81-28), which is impaired for Benthic macroinvertebrate, Scarletts Brook (MA81-25) which is impaired for chloride, and Washacum Brook, which is impaired for dissolved oxygen. There are also two unnamed tributaries to the Wachusett Reservoir (MA81-54 and MA81-49) that are also impaired for chloride.

### 6.2 Bacteria Impairments

The Final Year 2018/2020 Integrated List of Waters lists both Poor Farm Brook (MA8132) and Gates Brook (MA81-24) as having a bacteria impairment.

#### 6.2.1 *Public Education and Outreach*

The Town has been utilizing educational materials to inform residents regarding actions that can be taken to reduce sources of bacteria in their MS4. The Town will continue to distribute information to all residents about the proper management of dog waste. This message has been disseminated to all residents annually, beginning in the first year of the permit.

The Town will also continue to distribute information to septic system owners about proper maintenance.

### 6.2.2 *Illicit Discharges*

In implementing their Illicit Discharge Detection and Elimination Program, the Town has designated all catchments that are tributary to Poor Farm Brook and Gates Brook as high priority under the catchment prioritization and ranking.

## 6.3 Chloride Impairments

The Massachusetts Year 2018/2020 Integrated List of Waters lists Gates Brook (MA81-24), Scarletts Brook (MA81-25), and two unnamed tributaries to the Wachusett Reservoir (MA81-54 and MA81-49) as having a chloride impairment.

### 6.3.1 *Salt Reduction Plan*

The Town developed a Draft Salt Reduction Plan during Permit Year 5. This report includes actions designed to achieve salt reduction on municipal roads and facilities, and private facilities that discharge to the Town's MS4 in the impaired catchments. This report will be finalized during Permit Year 5 and will be appended to the Town's annual report and this SWMP upon completion.

The Town must track the types and amount of salt applied to all permittee owned and maintained surfaces and report on the salt use in the annual reports.

The Town must plan activities for salt reduction including but not limited to the following activities:

- Operational changes such as pre-wetting, pre-treating salt stockpiles, 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;
- 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.

### 6.3.2 *Regulatory Updates*

The Town must 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.

During Permit Year 5, the Town continued the development of draft Stormwater Rules and Regulations to address and regulate the storage and usage of road salt. Section 8.d.iv.2 of these Draft Stormwater Rules and Regulations requires that "Operation and Maintenance Plans for commercial or industrial projects include a provision to prevent the exposure of any salt stockpiles stored on the property to precipitation and/or stormwater runoff." Section 9.g.ii requires applicants discharging to a waterbody listed as impaired due to chloride in categories 5 or 4b on the Massachusetts Integrated List of Waters to "take measures to prevent exposure of any salt stockpiles to precipitation and runoff at all commercial and industrial properties within the regulated area and

document these measures in the Stormwater Management Permit Application.” These new Stormwater Rules and Regulations are expected to be adopted during Permit Year 6.

### 6.3.3 *Public Education and Outreach*

The Town must distribute educational materials to private Commercial/ Industrial site owners on the proper storage and application rates of winter deicing material and a description of how to minimize salt use to protect local waterbodies in the November/December timeframe. During Permit Year 5, the Town developed an informational flyer discussing chloride pollution in stormwater in West Boylston. The flyer provides information about employee training, snow and ice removal, salt and chemical deicer storage, salt usage tracking, and operation and maintenance best management practices to help reduce chloride pollution in stormwater runoff. This educational flyer will be distributed by the Town during Permit Year 6.

### 6.3.4 *Stormwater Management in New Development and Redevelopment*

The Town must establish procedures and requirements to minimize salt usage and require the use of salt alternatives where necessary. Section 8.d.iv.1 of the Town’s Stormwater Bylaw, updated in Permit Year 5, requires that salt usage be minimized wherever feasible, and that salt alternatives be used where deemed necessary by the Town. These stormwater bylaw updates are anticipated to be adopted during Permit Year 6.

## 6.4 **Phosphorus Impairment**

The Town of West Boylston is partially located within the Blackstone River Watershed, and this portion of the town is tributary to Lake Quinsigamond, which has a Total Maximum Daily Load (TMDL) for phosphorus. For phosphorus impaired waters with a TMDL, Appendix F of the 2016 MS4 Permit requires the development of a Phosphorus Control Plan (PCP) to reduce the amount of phosphorus in stormwater discharges from the storm drain system to these impaired receiving waters and their tributaries. The PCP must include intermediate and final phosphorus loading reduction targets that must be met through implementation of structural and non-structural BMPs. The 2016 MS4 Permit does not currently require the Town to develop a PCP for Lake Quinsigamond. However, if notification is received from EPA that West Boylston must develop a PCP, this SWMP will be updated to include specific requirements as they relate to the development and implementation of the PCP.

## 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 30, 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 West Boylston are referenced in Appendix E of this SWMP. West Boylston will append 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.

West Boylston undertook this SWMP, in part, 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.

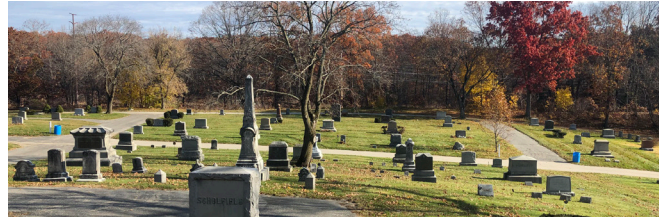
### 7.3 Modifications to the SWMP or Notice of Intent

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.
- The Town may request to replace an ineffective or infeasible BMP specifically identified in the SWMP with an alternative BMP at any time as long as the basis for the change is documented in the SWMP by, at a minimum:
  - 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.
- The Town shall indicate BMP modifications along with a brief explanation of the modification in each Annual Report.

Currently, West Boylston does not anticipate any major modifications to the SWMP or NOI requiring official notification.





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# STORMWATER MANAGEMENT PLAN APPENDICES

MS4 GENERAL PERMIT COMPLIANCE

JUNE 2019  
UPDATED JUNE 2023



TOWN OF  
**West Boylston**  
MASSACHUSETTS

# swmp

APPENDICES

## APPENDIX A

### Abbreviations and Definitions

**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 topsoils.

**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 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.

.....

**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 the 2016 MS4 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)).

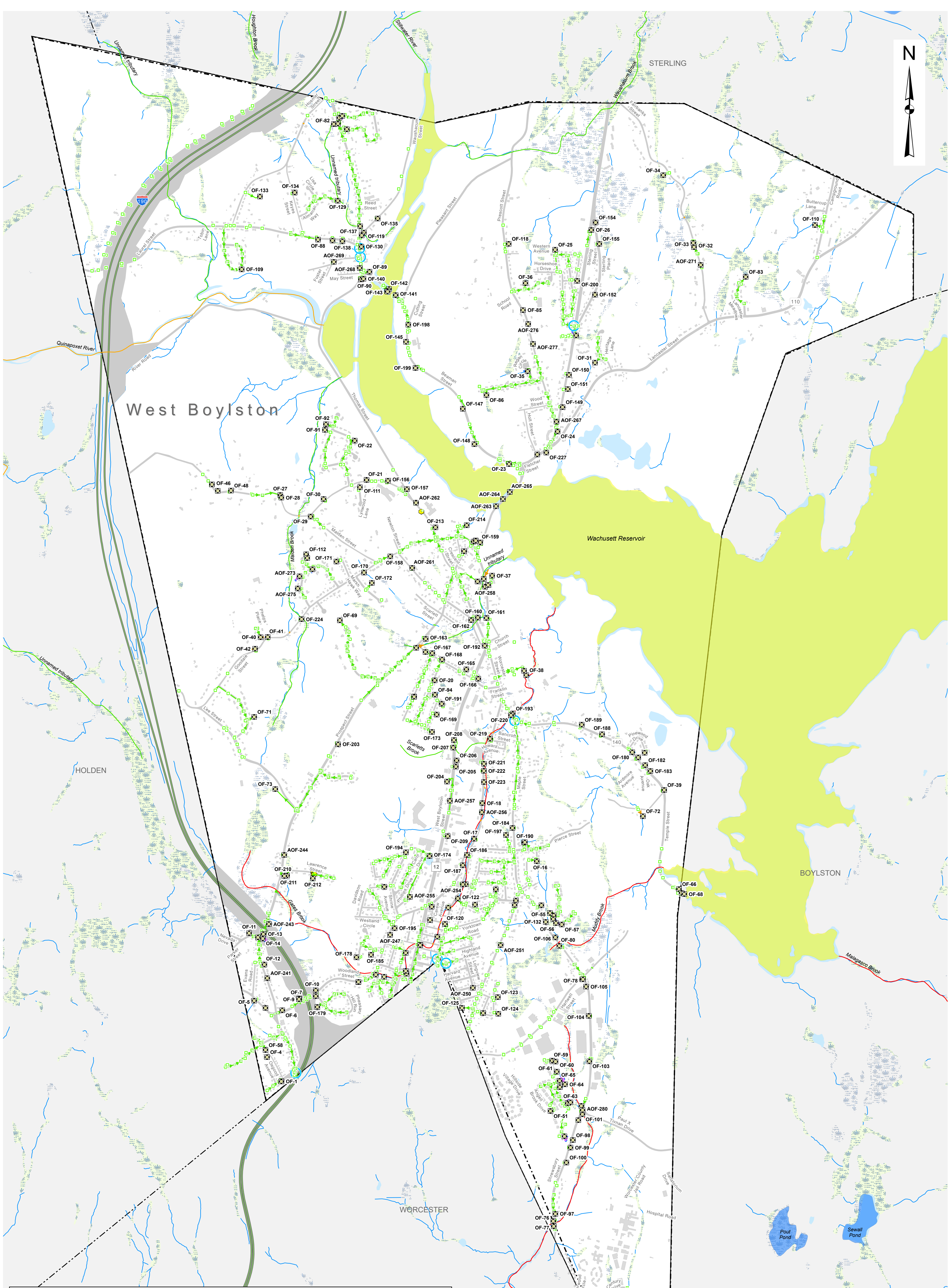
#### ABBREVIATIONS AND ACRONYMS

**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



**Legend**

☒ Outfalls	2 - Attaining some uses; other uses not assessed	■ Building
● Storm Manholes	3 - No uses assessed	— Hydrologic Connection
○ Catch Basins	4A - Impaired - TMDL is completed	■ Marsh/Bog
○ Interconnections	4C - Impairment not caused by a pollutant	■ Wooded marsh
— Storm Gravity Mains	5 - Impaired - TMDL required	■ Cranberry Bog
— Storm Culverts	2 - Attaining some uses; other uses not assessed	■ Salt Marsh
● Storm Network Structures	3 - No uses assessed	■ Open Water
	4A - Impaired - TMDL is completed	■ Tidal Flats
	4C - Impairment not caused by a pollutant	■ Beach/Dune
	5 - Impaired - TMDL required	■ Storm Detention Areas

**FIGURE 1**  
**TOWN OF WEST BOYLSTON, MASSACHUSETTS**  
**STORMWATER GIS**

DRAINAGE SYSTEM AND  
RECEIVING WATERS

JULY 2023 SCALE: NOTED

Weston & Sampson

## 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

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- 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

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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.

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- 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	Mattapoisett
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	
		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	

Click to lengthen table





## 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				





# 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 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%

<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>
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:

<b>Item Number</b>	<b>Phase 2 of the PCP Component and Milestones</b>	<b>Completion Date</b>
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	1. Performance Evaluation. 2. Full implementation of all structural controls used to demonstrate that the total phosphorus export rate ( $P_{exp}$ ) from the PCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load( $P_{allow}$ ) plus the applicable Phosphorus Reduction Requirement ( $P_{RR}$ ) multiplied by 0.65 $P_{exp} \leq P_{allow} + (P_{RR} \times 0.65)$	13 years after permit effective date
2-10	Performance Evaluation	14 years after permit effective date
2-11	1. Performance Evaluation. 2. Full implementation of all structural controls used to demonstrate that the total phosphorus export rate ( $P_{exp}$ ) from the PCP Area in mass/yr is equal to or less than the applicable Allowable Phosphorus Load( $P_{allow}$ ) plus the applicable Phosphorus Reduction Requirement ( $P_{RR}$ ) multiplied by 0.50 $P_{exp} \leq P_{allow} + (P_{RR} \times 0.50)$	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	Taylors 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	Shumatuscacant 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	Popponeset 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

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<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
--------	-----	------	-----	------	-----	------

\*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 ( $\text{PRF}_{\text{sweeping}}$ ) for sweeping impervious areas**

Frequency <sup>1</sup>	Sweeper Technology	$\text{PRF}_{\text{sweeping}}$
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**

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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.

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**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>).

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**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:**

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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.



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**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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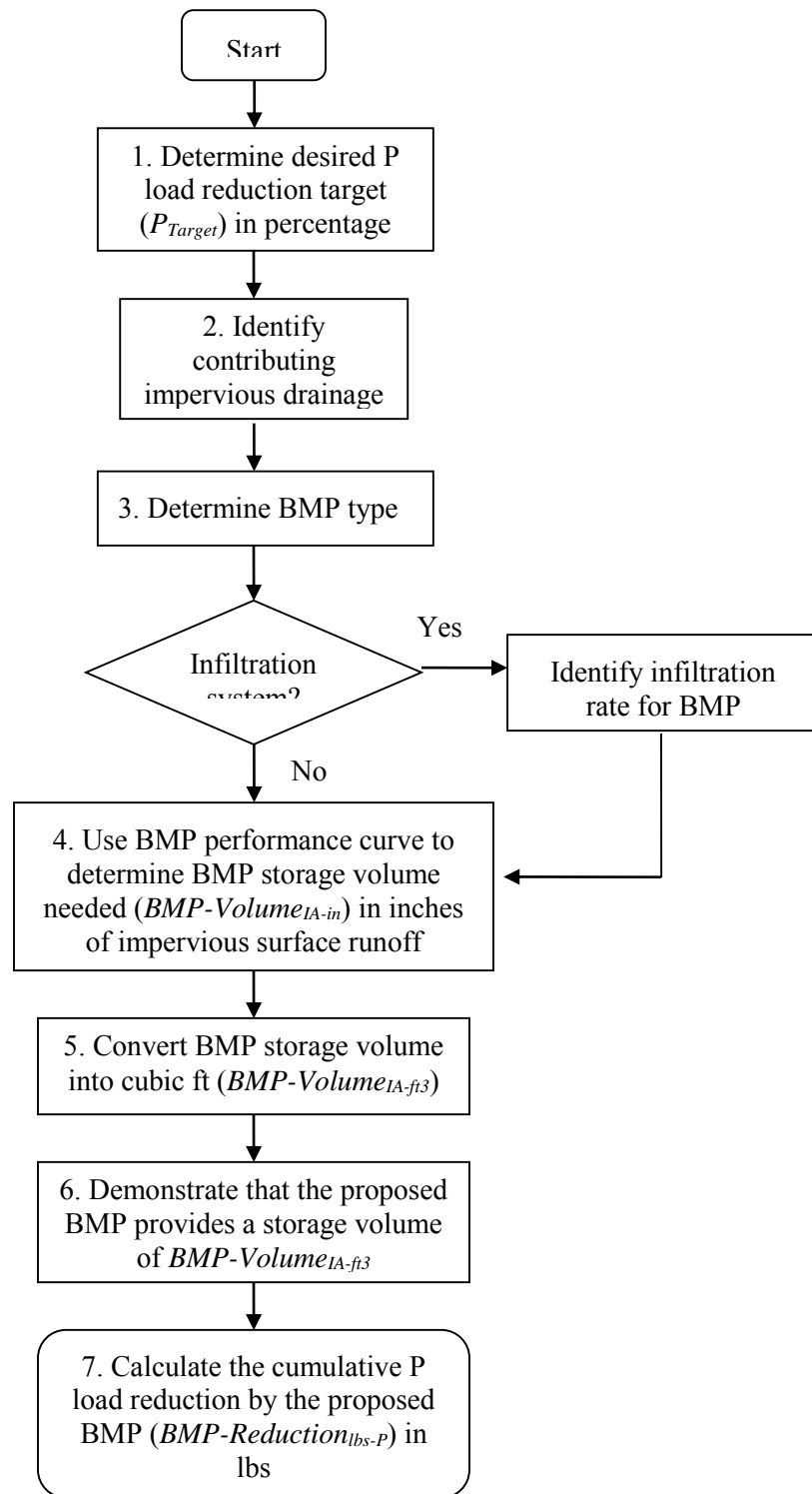
**Table 3- 2: MassGIS land-use categories with associated land-use groups for phosphorus load calculations**

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

## Appendix F Attachment 3

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 ( $P_{\text{target}} = 70\%$ )

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  $P_{\text{target}} = 70\%$ . 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  $P_{\text{target}} = 70\%$  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:

$$\begin{aligned} \text{BMP-Volume}_{\text{IA-ft}^3} &= \text{IA (acre)} \times \text{BMP-Volume}_{\text{IA-in}} \times 3,630 \text{ ft}^3/\text{acre-in} \\ \text{BMP-Volume}_{\text{IA-ft}^3} &= 2.57 \text{ acre} \times 0.36 \text{ in} \times 3,630 \text{ ft}^3/\text{acre-in} \\ &= \mathbf{3,359 \text{ ft}^3} \end{aligned}$$

6) A narrow trapezoidal infiltration basin with the following characteristics is proposed to achieve the  $P_{\text{Target}}$  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  $P_{\text{Target}}$  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.

$$\begin{aligned} \text{BMP Load} &= \text{IA} \times \text{impervious cover phosphorus export loading rate for commercial use (see Table 3-1)} \\ &= 2.57 \text{ acres} \times 1.78 \text{ lbs/acre/yr} \\ &= 4.58 \text{ lbs/yr} \end{aligned}$$

$$\begin{aligned} \text{BMP-Reduction}_{\text{lbs-P}} &= \text{BMP Load} \times (P_{\text{target}}/100) \\ \text{BMP-Reduction}_{\text{lbs-P}} &= 4.58 \text{ lbs/yr} \times (70/100) \\ &= \mathbf{3.21 \text{ lbs/yr}} \end{aligned}$$

**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:

$$\begin{aligned} \text{BMP-Volume}_{IA-in} &= (70\% - 65\%) / (75\% - 65\%) \times (0.4 \text{ in} - 0.3 \text{ in}) + 0.3 \text{ in} \\ &= 0.35 \text{ inches} \end{aligned}$$

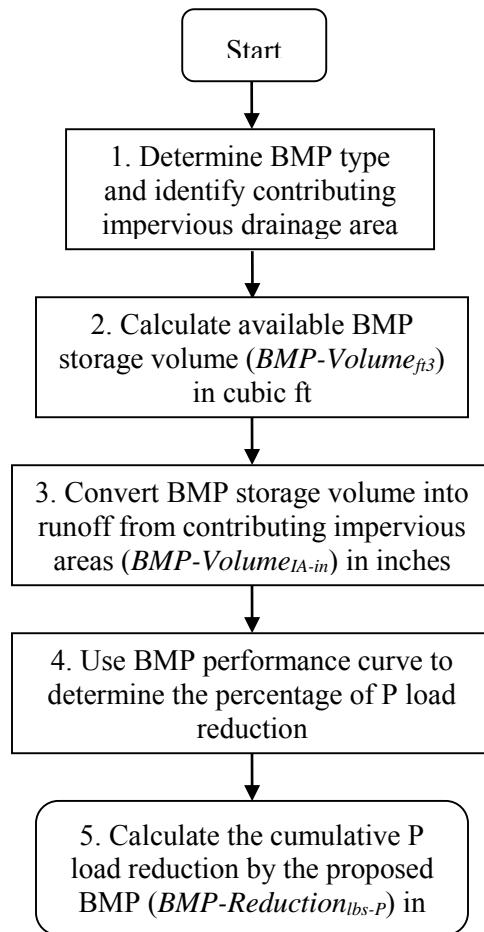
**5 alternative)** Convert the resulting BMP-Volume<sub>IA-in</sub> to cubic feet (BMP-Volume<sub>IA-ft<sup>3</sup></sub>) using equation 3-1:

$$\begin{aligned} \text{BMP-Volume}_{IA-ft^3} &= 2.57 \text{ acre} \times 0.35 \text{ in} \times 3,630 \text{ ft}^3/\text{acre-in} \\ &= \mathbf{3,265 \text{ ft}^3} \end{aligned}$$

**(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:

$$\begin{aligned} \text{BMP-Volume}_{\text{BMP-ft}^3} &= (\text{surface area} \times \text{pond maximum depth}) + ((\text{soil mix depth} + \\ &\quad \text{gravel layer depth})/12 \text{ in/ft}) \times \text{surface area} \times \text{gravel layer porosity}) \\ &= (1,200 \text{ ft}^2 \times 0.5 \text{ ft}) + ((38/12) \times 1,200 \text{ ft}^2 \times 0.4) \\ &= 2,120 \text{ ft}^3 \end{aligned}$$

**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:

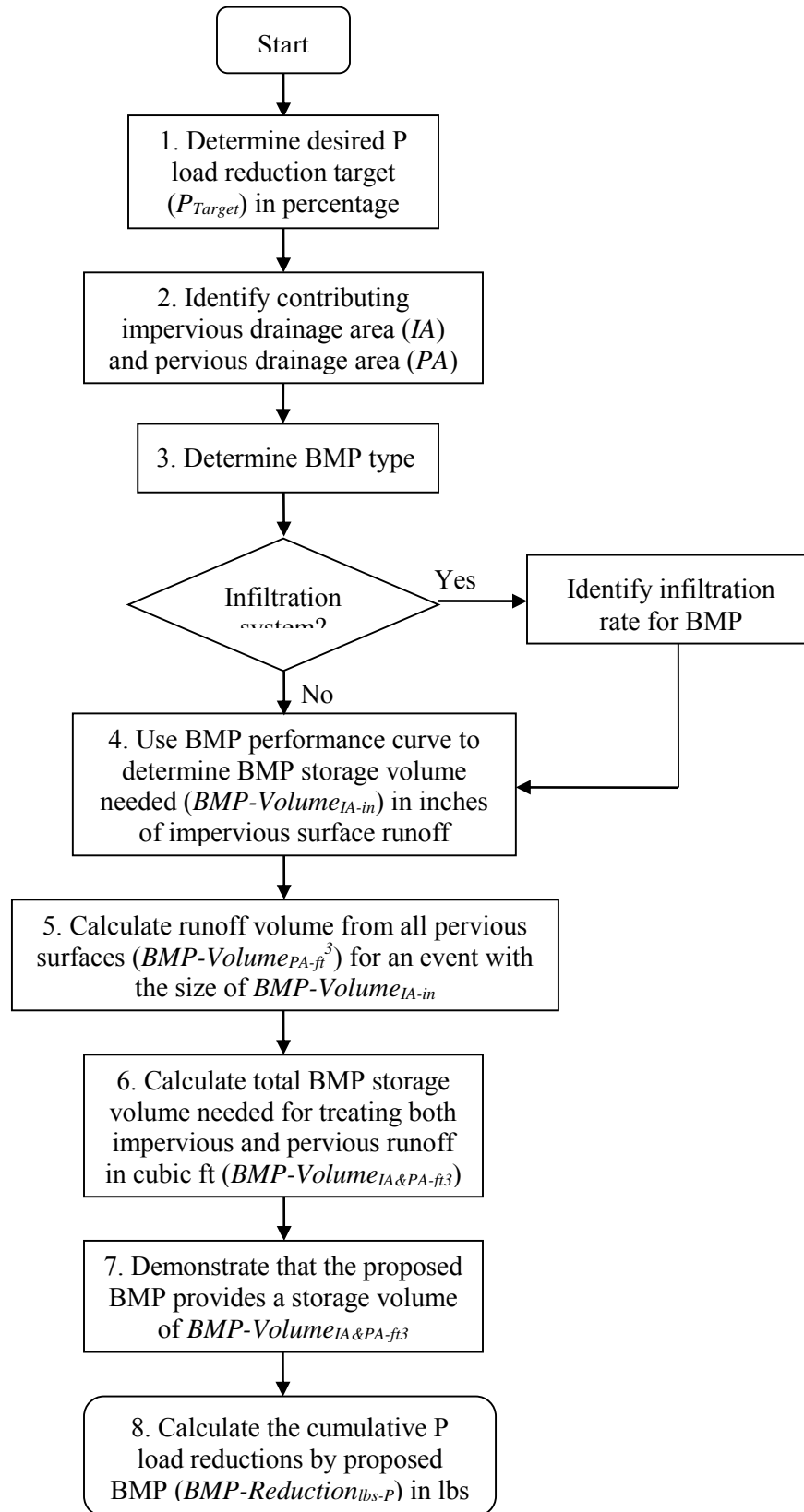
$$\begin{aligned} \text{BMP Load} &= \text{IA} \times \text{impervious cover phosphorus export loading rate for HDR (see Table 3-1)} \\ &= 1.49 \text{ acres} \times 2.32 \text{ lbs/acre/yr} \\ &= 3.46 \text{ lbs/yr} \end{aligned}$$

$$\begin{aligned} \text{BMP Reduction}_{\text{lbs-P}} &= \text{BMP Load} \times (\text{BMP Reduction}_{\%-\text{P}} / 100) \\ \text{BMP Reduction}_{\text{lbs-P}} &= 3.46 \text{ lbs/yr} \times (51 / 100) \\ &= \mathbf{1.76 \text{ lbs/yr}} \end{aligned}$$

**(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 ( $BMP\text{-Volume}_{IA-in}$ );

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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  $_{PA-ft^3}$ ) for a rainfall size equal to the sum of BMP Volume  $_{IA-in}$ , determined in step 4. The runoff volume for each distinct pervious area must be determined;

$$\text{BMP-Volume}_{PA-ft^3} = \sum (PA \times (\text{runoff depth}) \times 3,630 \text{ ft}^3/\text{acre-in}) \quad (PA_1, \dots, PA_n)$$

**(Equation 3-5)**

- 6) Using equation 3-6 below, calculate the BMP storage volume in cubic feet (BMP-Volume  $_{IA\&PA-ft^3}$ ) needed to treat the runoff depth from the contributing impervious (IA) and pervious areas (PA);

$$\text{BMP-Volume}_{IA\&PA-ft^3} = \text{BMP Volume}_{PA-ft^3} + (\text{BMP Volume}_{IA-in} \times IA \text{ (acre)}) \times 3,630 \text{ ft}^3/\text{acre-in}$$

**(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  $_{IA\&PA-ft^3}$ , will be provided to achieve the  $P_{\text{Target}}$ ; and
- 8) Calculate the cumulative phosphorus load reduction in pounds of phosphorus (BMP-Reduction  $_{lbs-P}$ ) for the structural BMP using the BMP Load (as calculated from the procedure in Attachment 1 to Appendix F) and the  $P_{\text{target}}$  by using equation 3-2:

$$\text{BMP-Reduction}_{lbs-P} = \text{BMP Load} \times (P_{\text{target}} / 100) \quad \text{(Equation 3-2)}$$

**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 ( $P_{\text{Target}}$ ) 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  $_{IA\&PA-ft^3}$ ); and
- B)** Cumulative phosphorus reduction in pounds that would be accomplished by the BMP (BMP-Reduction  $_{lbs-P}$ )

**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<sub>IA-in</sub>) 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<sub>PA-ft<sup>3</sup></sub>) 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 ft <sup>3</sup> /acre-in (ft <sup>3</sup> )
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<sub>IA&PA-ft<sup>3</sup></sub>) 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%.

$$\text{BMP-Reduction}_{\text{lbs-P}} = \text{BMP Load} \times (\text{P}_{\text{target}} / 100) \quad \text{(Equation 3-2)}$$

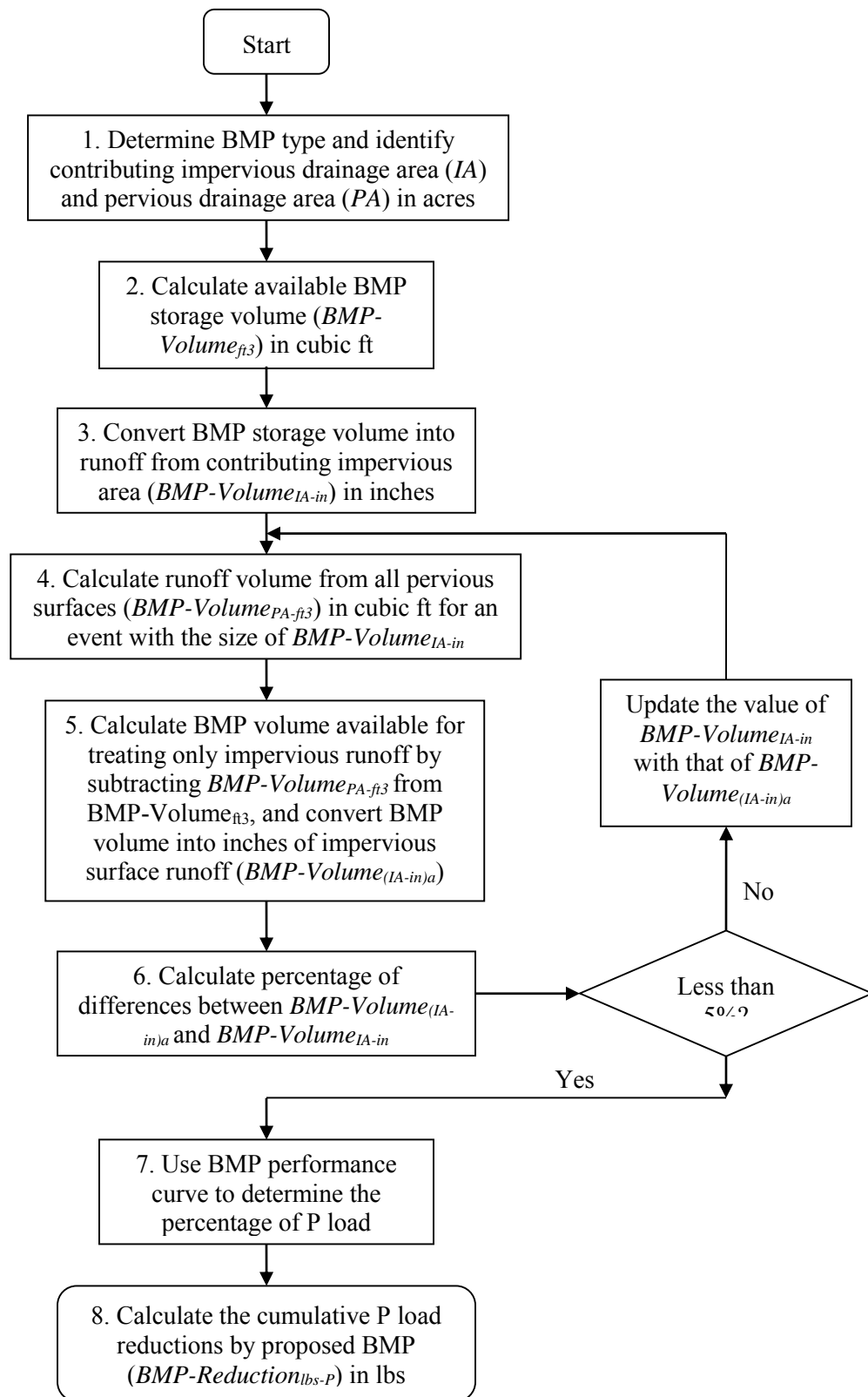
Using Table 3-1, the BMP Load is calculated:

$$\begin{aligned} \text{BMP Load} &= (\text{IA} \times \text{PLER}_{\text{HDR}}) + (\text{PA}_{\text{lawn HSG B}} \times \text{PLER}_{\text{HSG B}}) + (\text{PA}_{\text{lawn HSG C}} \times \text{PLER}_{\text{HSG C}}) + (\text{PA}_{\text{forest}} \times \text{PA}_{\text{PLER}_{\text{For}}}) \\ &= (4.00 \text{ acre} \times 2.32 \text{ lbs/acre/yr}) + (0.50 \text{ acres} \times 0.12 \text{ lbs/acre/yr}) + (1.00 \text{ acre} \times 0.21 \text{ lbs/acre/yr}) + (1.00 \text{ acres} \times 0.13) \\ &= 9.68 \text{ lbs/yr} \\ \text{BMP-Reduction}_{\text{lbs-P}} &= \text{BMP Load} \times (\text{P}_{\text{target}} / 100) \\ \text{BMP-Reduction}_{\text{lbs-P}} &= 9.68 \text{ lbs/yr} \times 55/100 \\ &= \mathbf{5.32 \text{ lbs/yr}} \end{aligned}$$

**(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-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-Volume  $(IA-ft^3)_3 = 48,155 \text{ ft}^3 - 3,358 \text{ ft}^3$   
 $= 44,797 \text{ ft}^3$

$$\begin{aligned}\text{BMP-Volume } (IA-in)_3 &= (44,797 \text{ ft}^3/11.75 \text{ acre}) \times (12 \text{ in/ft} \times 1 \text{ acre}/43,560 \text{ ft}^2) \\ &= 1.05 \text{ in}\end{aligned}$$

- 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-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-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%.

$$\text{BMP-Reduction }_{lbs-P} = \text{BMP Load} \times (P_{target}/100) \quad \text{(Equation 3-2)}$$

Using Table 3-1, the BMP load is calculated:

$$\begin{aligned}\text{BMP Load} &= (IA \times \text{impervious cover phosphorus export loading rate for industrial}) \\ &\quad + (PA_{HSG D} \times \text{pervious cover phosphorus export loading rate for HSG D}) \\ &\quad + (PA_{HSG C} \times \text{pervious cover phosphorus export loading rate for HSG C})\end{aligned}$$

**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.  

$$\text{BMP Reduction lbs}_{-P} = \text{BMP Load} \times (\text{BMP Reduction \%}_{-P} / 100)$$

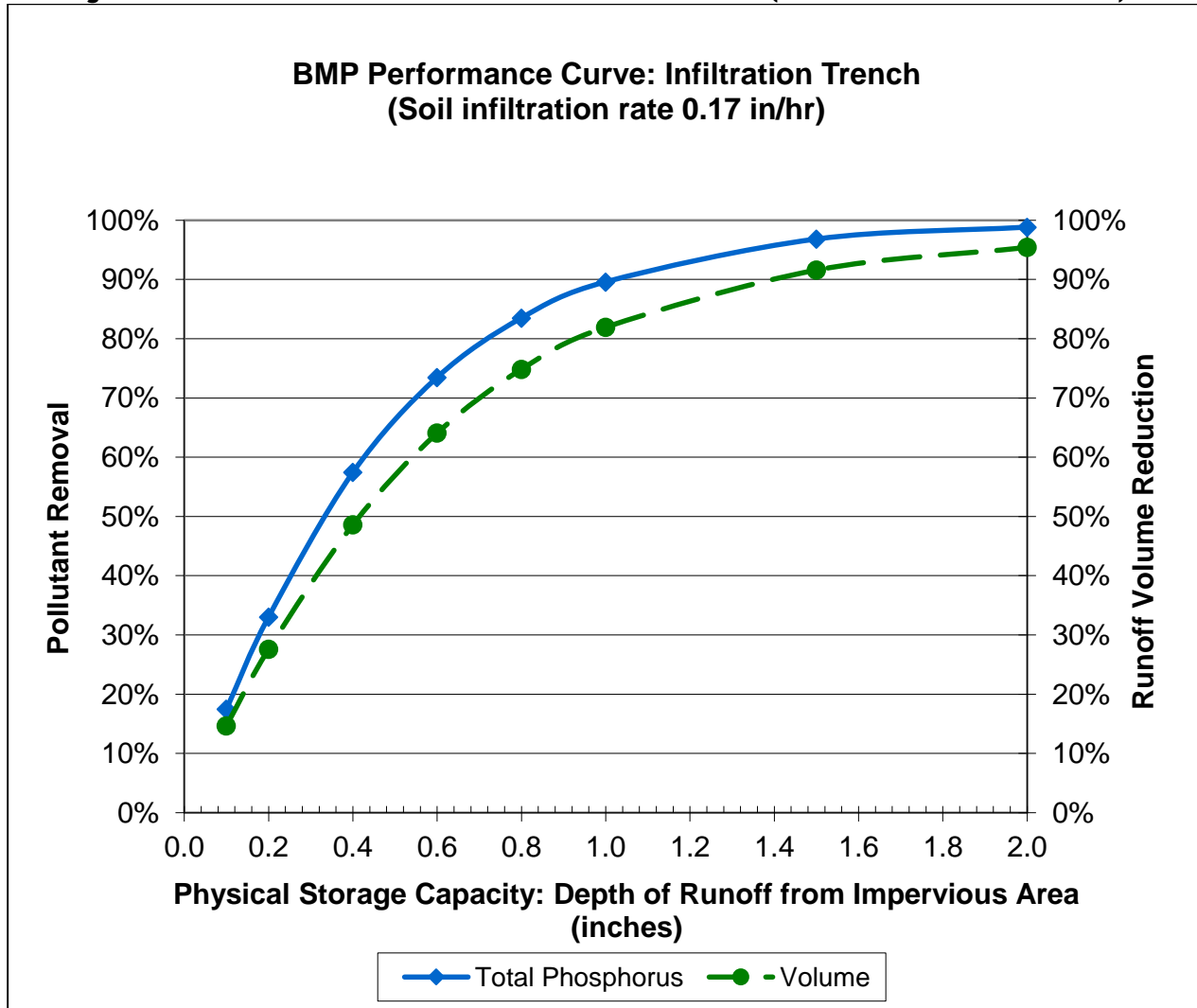
$$\text{BMP Reduction lbs}_{-P} = 6.57 \text{ lbs/yr} \times (94.1 / 100)$$

$$= 6.18 \text{ lbs/yr}$$

**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%

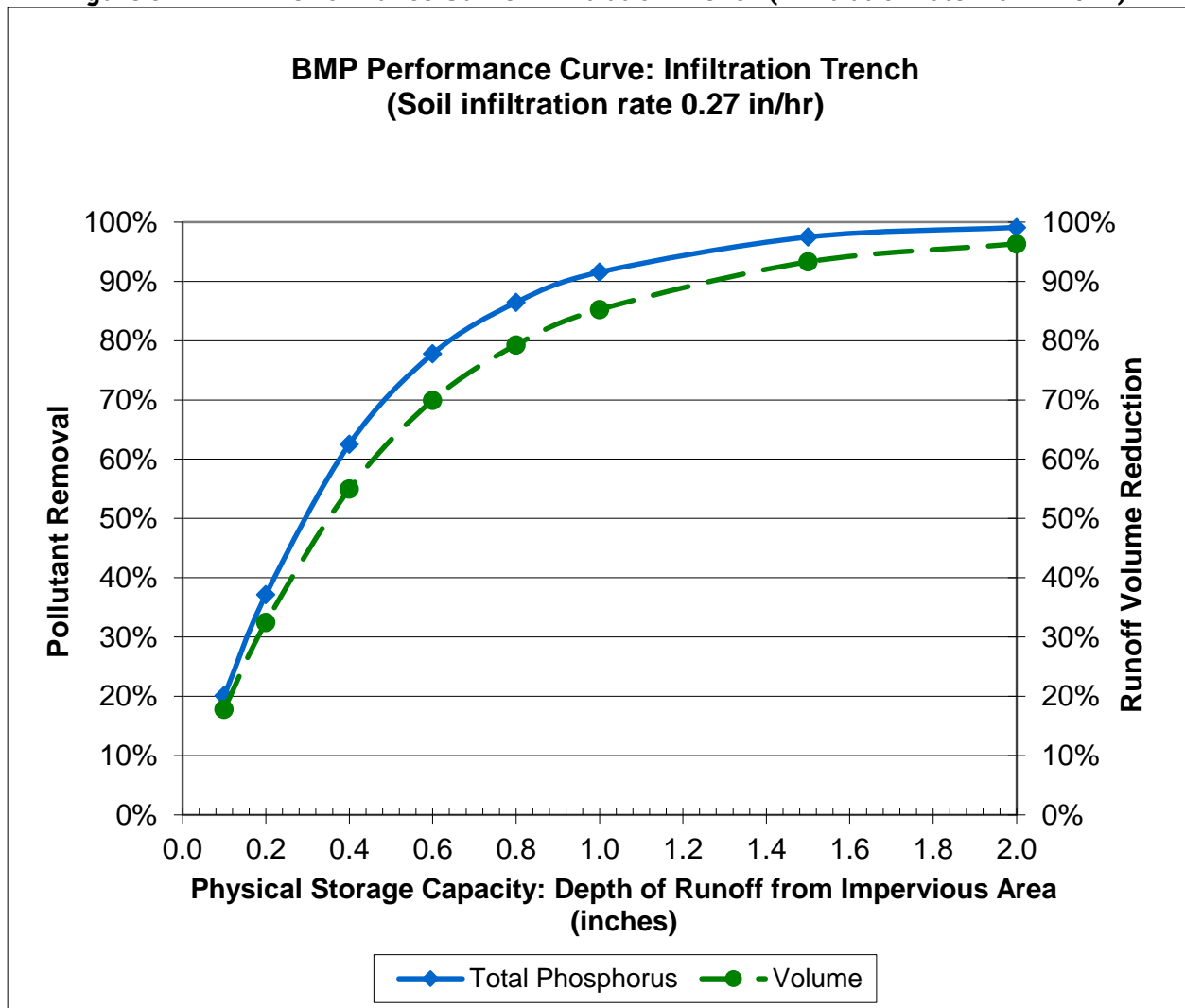
**Figure 3- 1: BMP Performance Curve: Infiltration Trench (infiltration rate = 0.17 in/hr)**



**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%

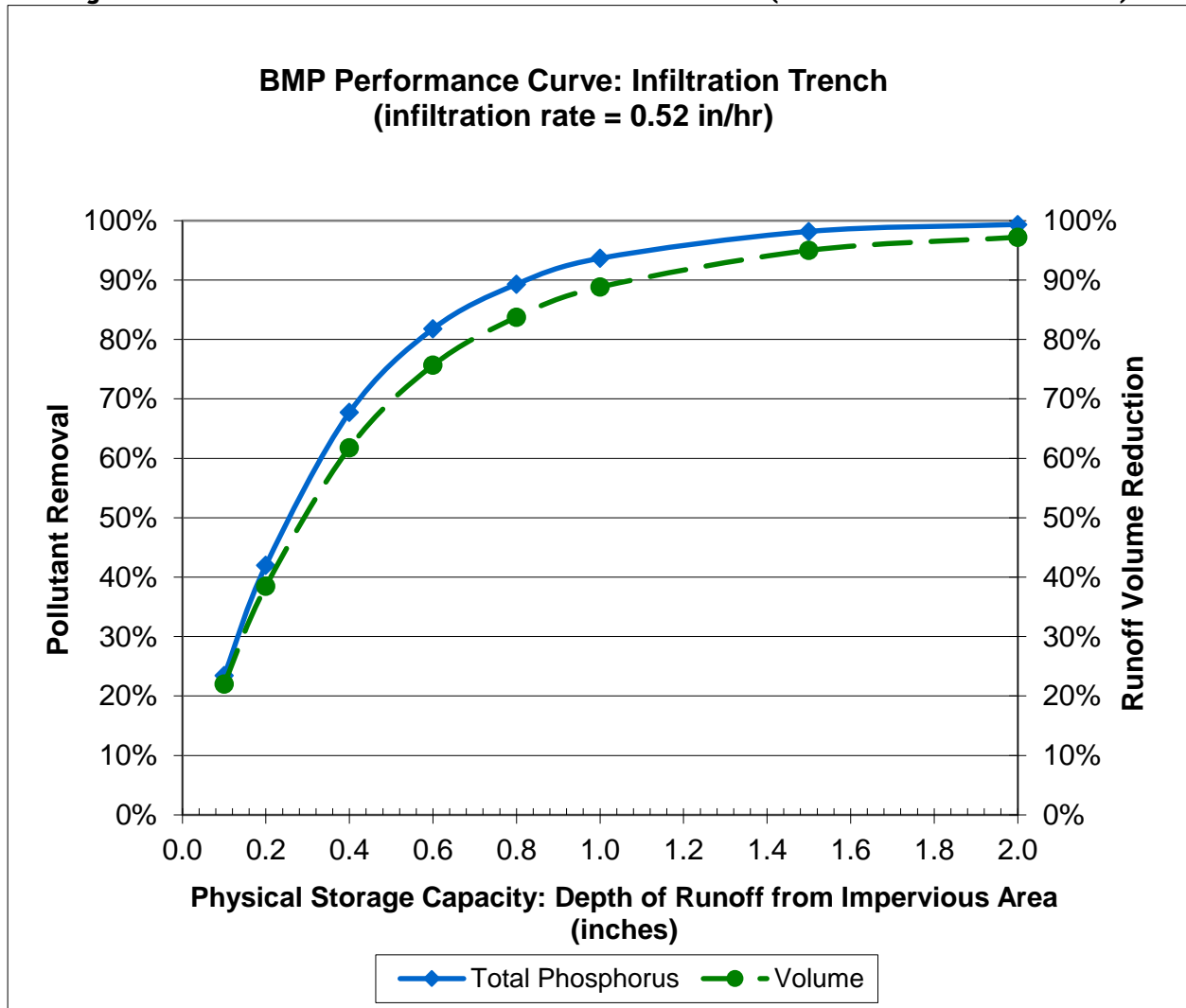
**Figure 3- 2: BMP Performance Curve: Infiltration Trench (infiltration rate = 0.27 in/hr)**



**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%

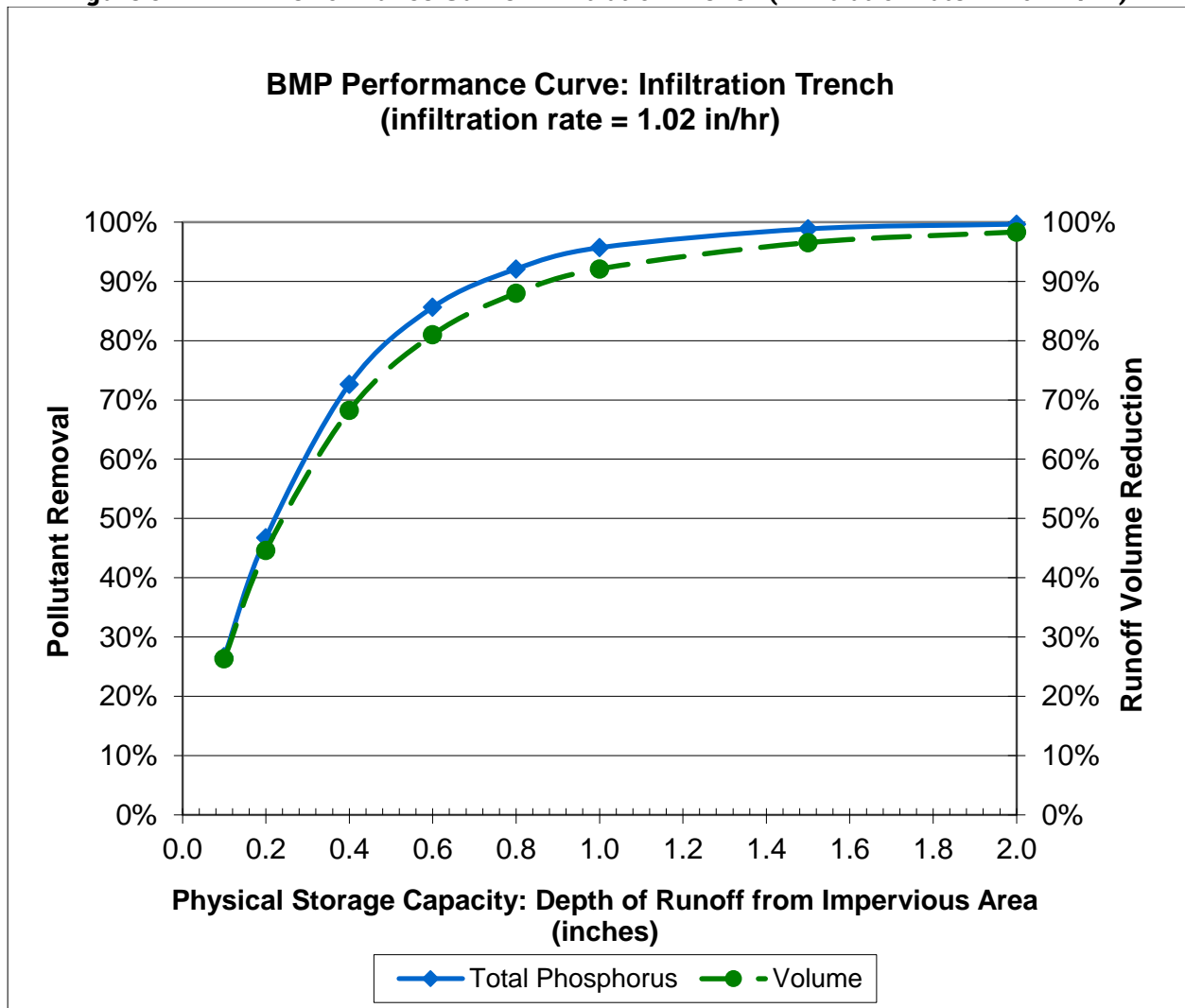
**Figure 3- 3: BMP Performance Curve: Infiltration Trench (infiltration rate = 0.52 in/hr)**



**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%

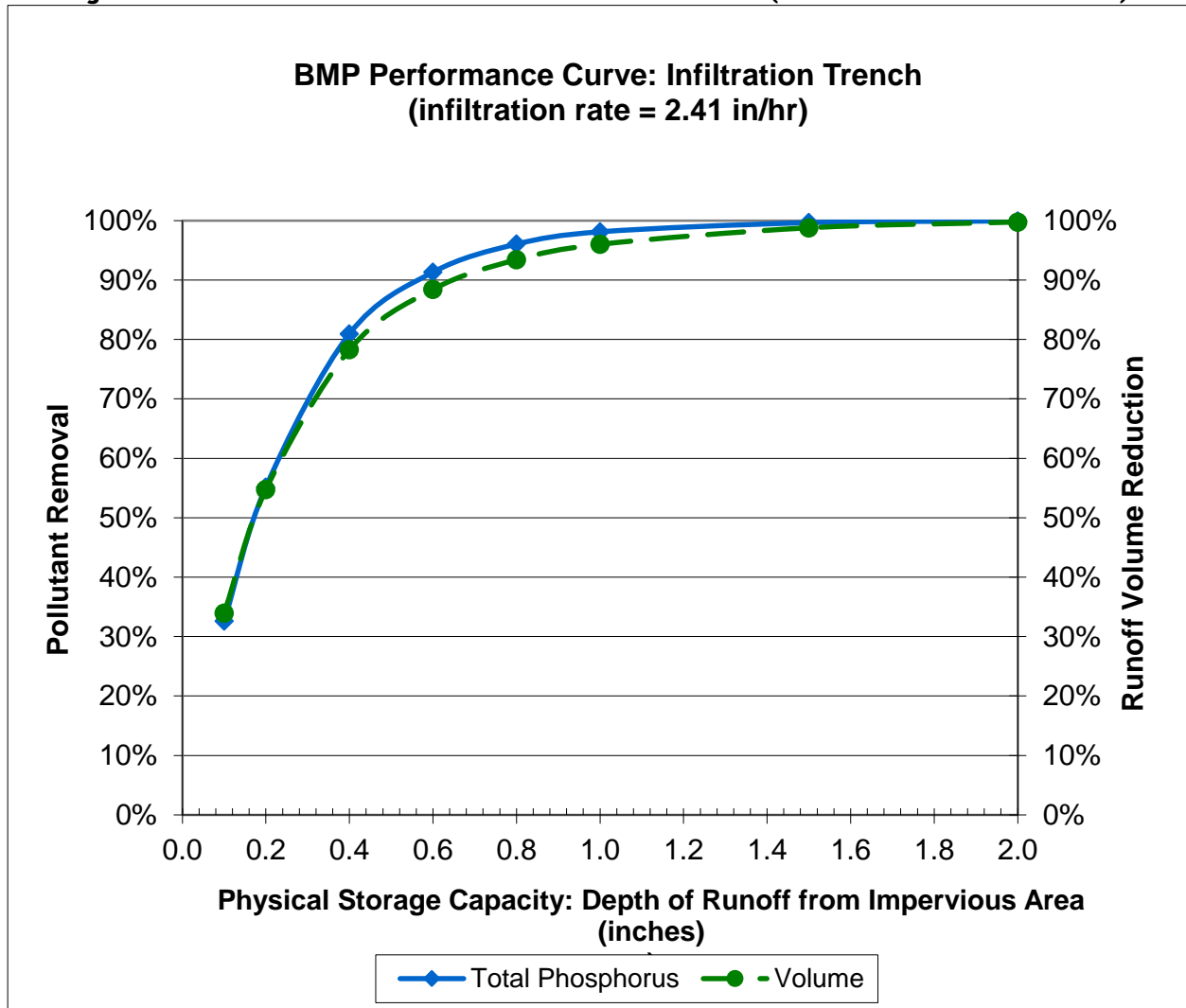
**Figure 3- 4: BMP Performance Curve: Infiltration Trench (infiltration rate = 1.02 in/hr)**



**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%

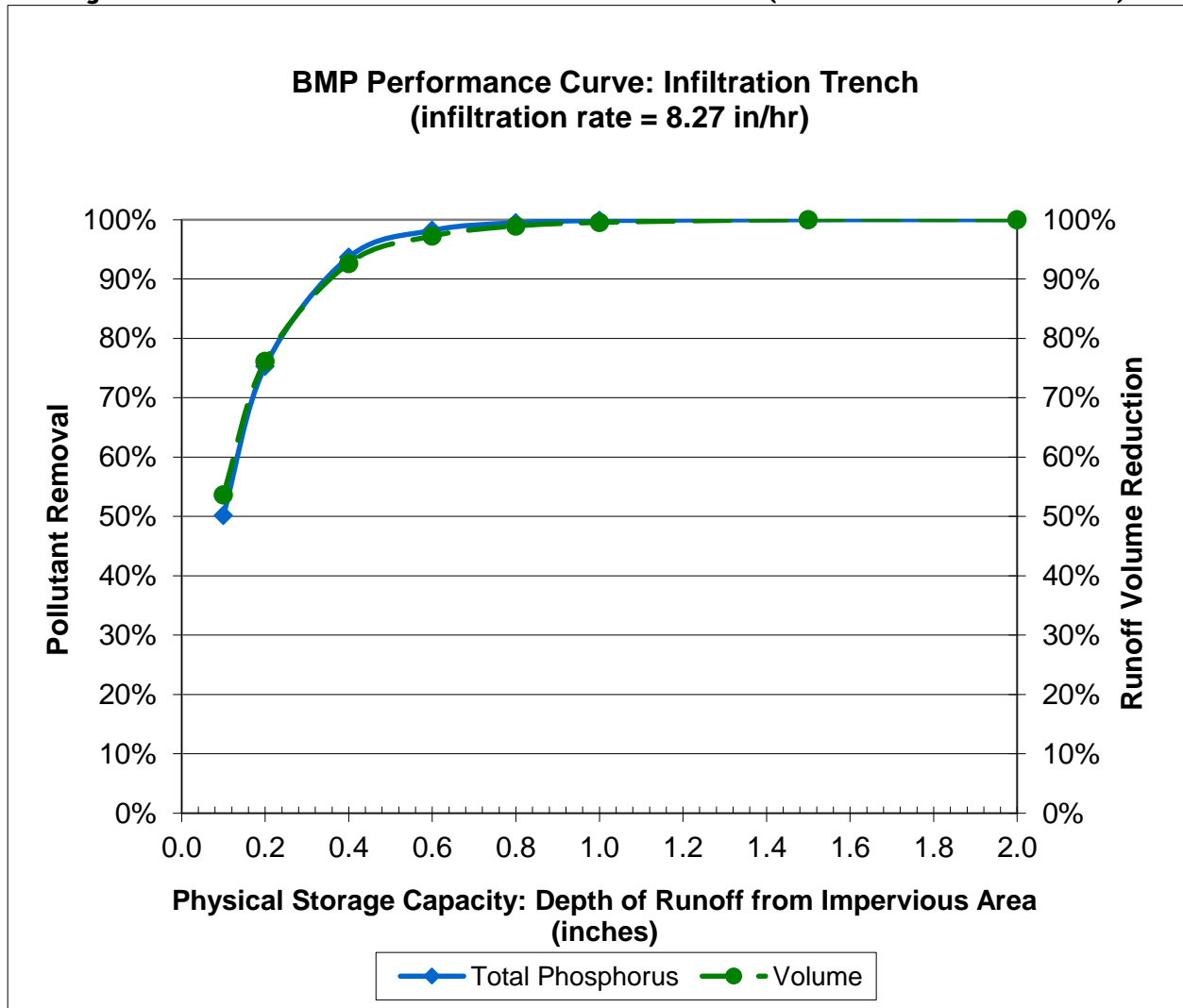
**Figure 3- 5: BMP Performance Curve: Infiltration Trench (infiltration rate = 2.41 in/hr)**



**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%

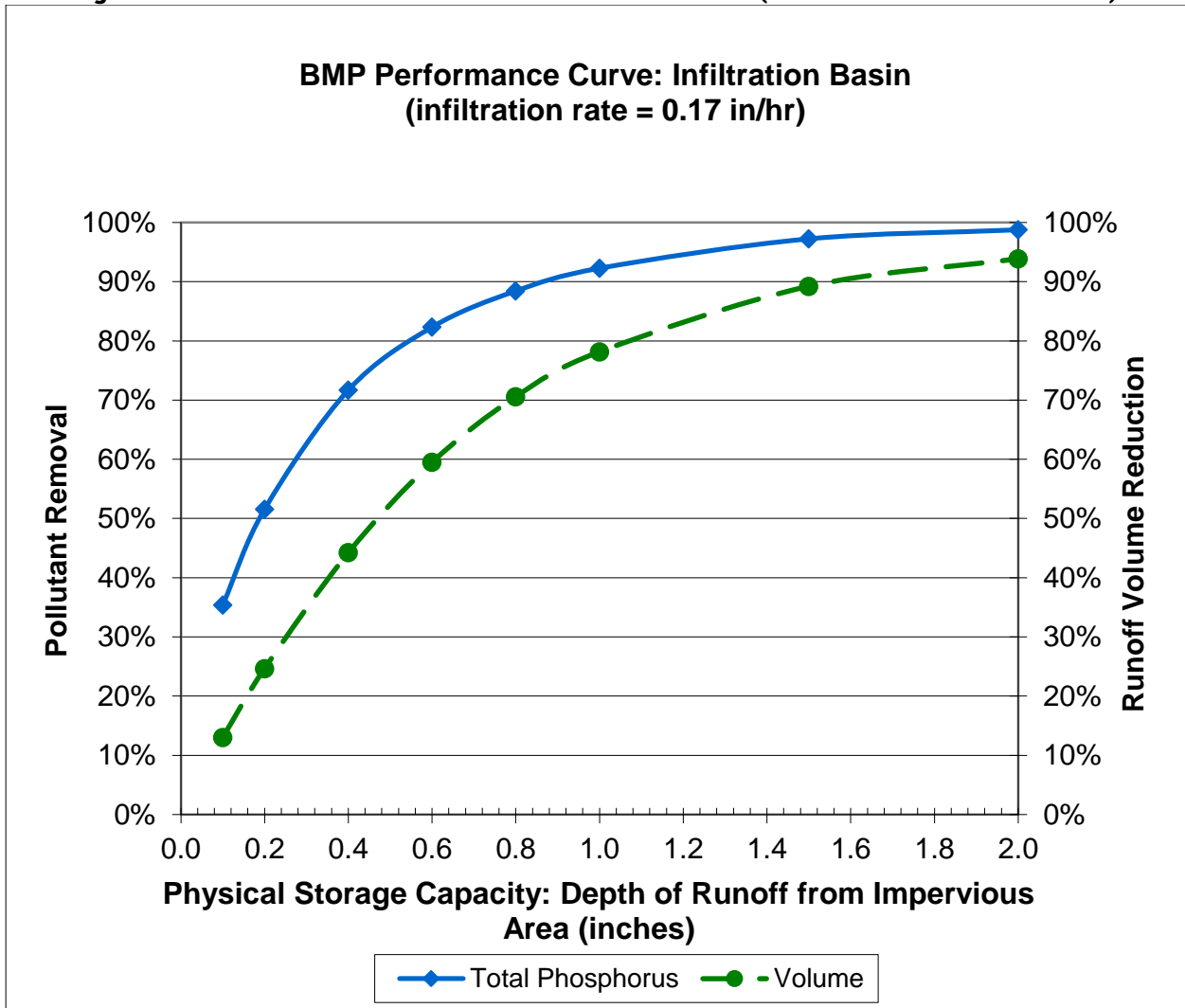
**Figure 3- 6: BMP Performance Curve: Infiltration Trench (infiltration rate = 8.27 in/hr)**



**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)**

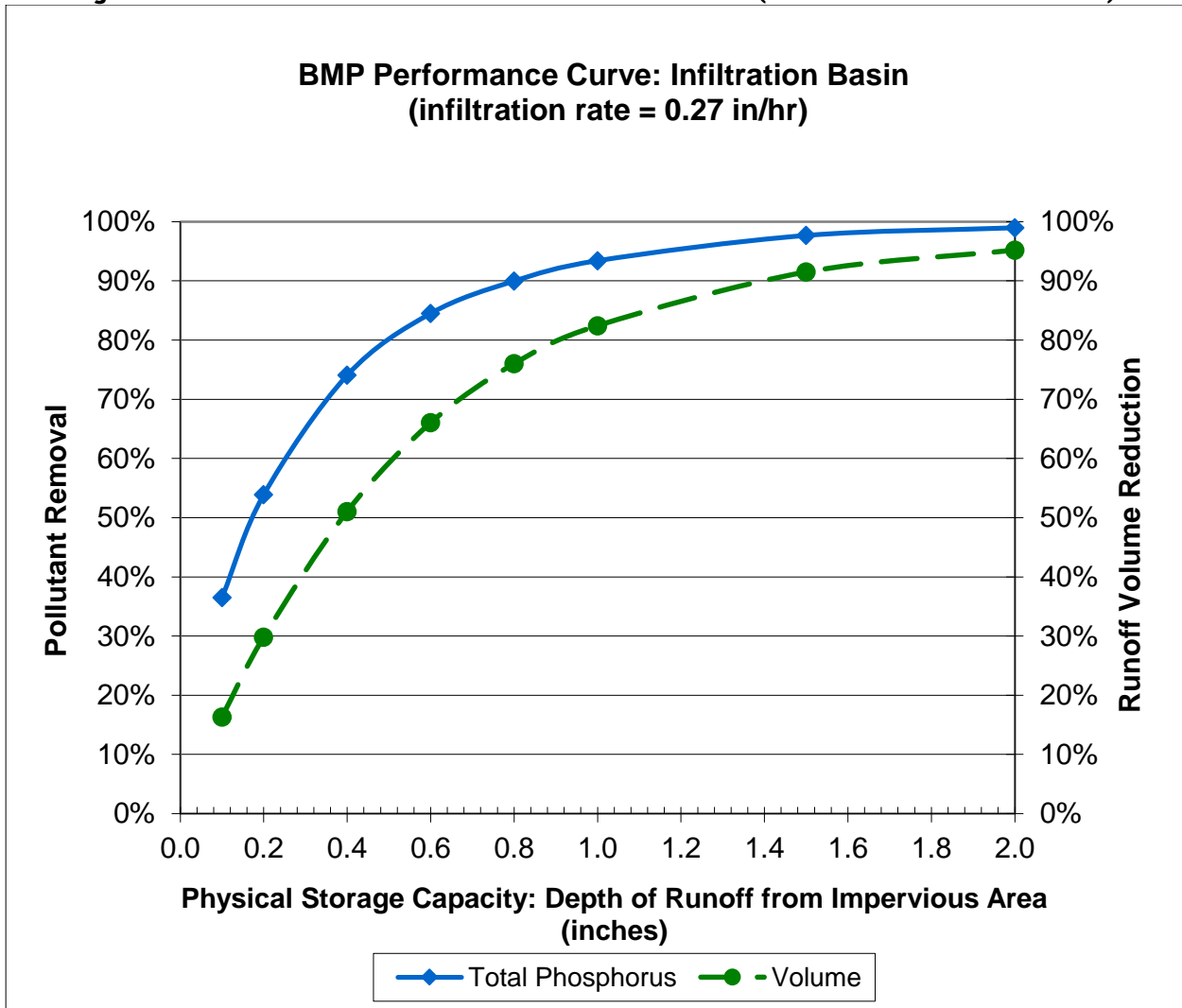




**Table 3- 11: Infiltration Basin (0.27 in/hr) BMP Performance Table**

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%

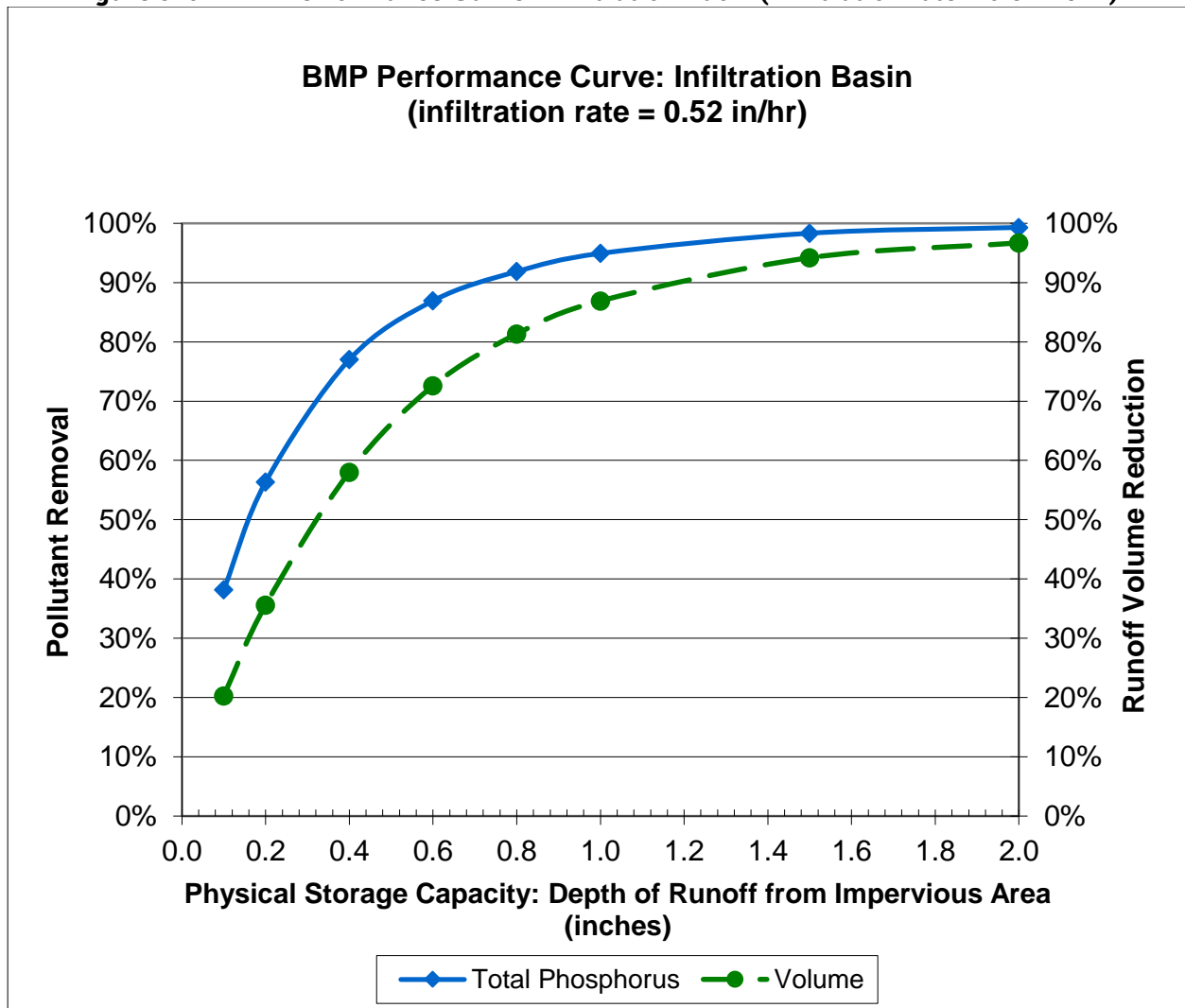
**Figure 3- 8: BMP Performance Curve: Infiltration Basin (infiltration rate = 0.27 in/hr)**



**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%

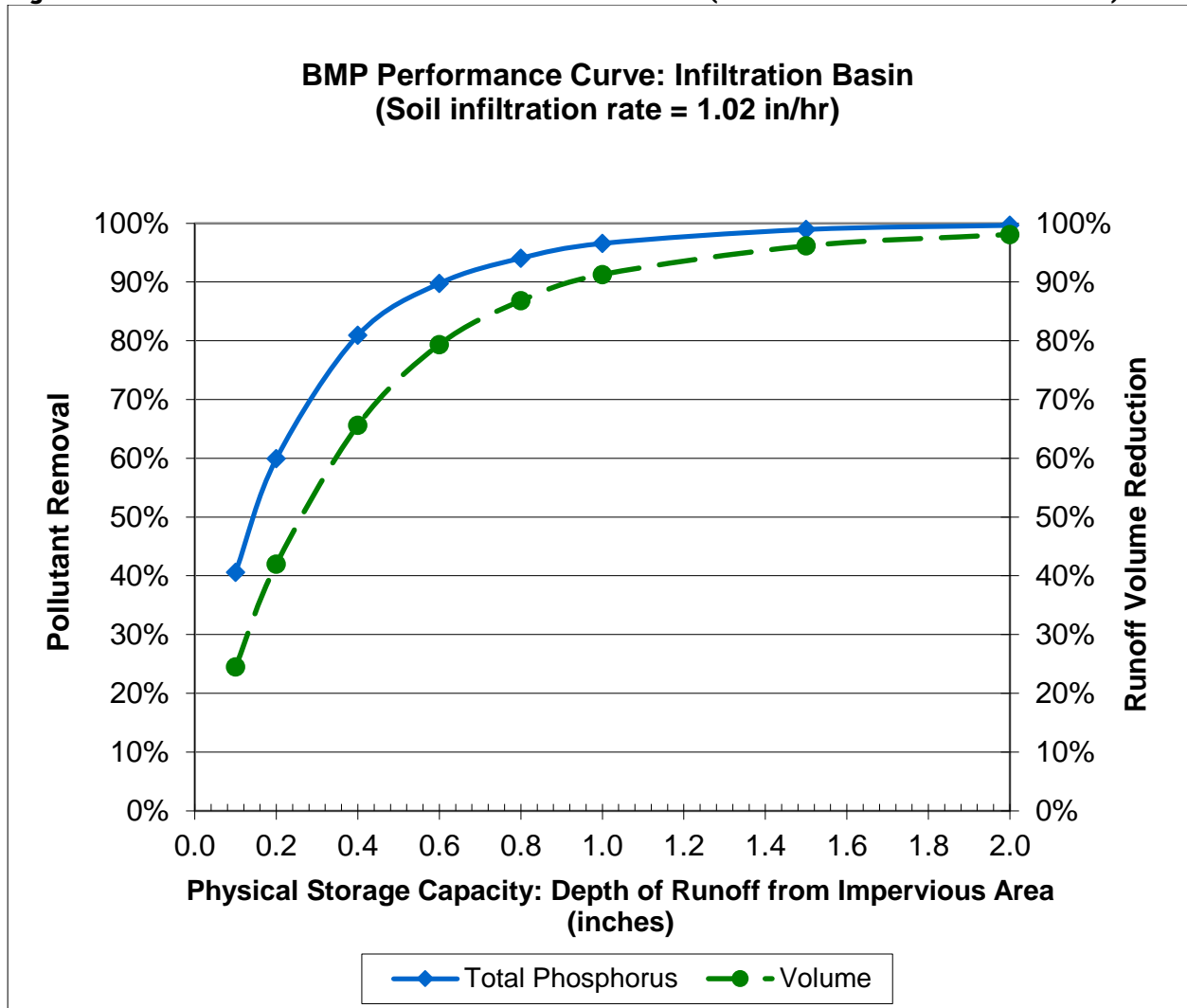
**Figure 3- 9: BMP Performance Curve: Infiltration Basin (infiltration rate = 0.52 in/hr)**



**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%

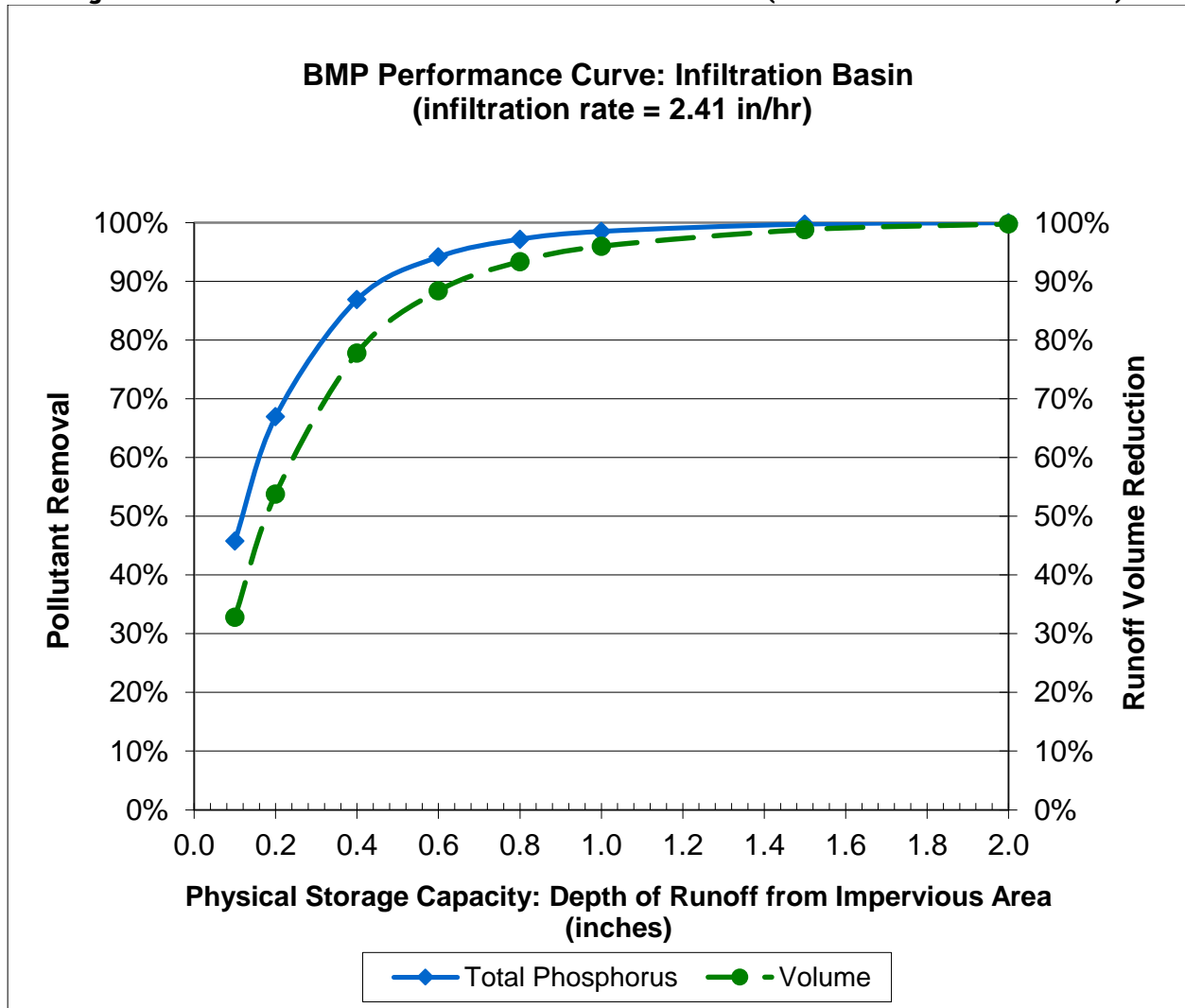
**Figure 3- 10: BMP Performance Curve: Infiltration Basin (Soil infiltration rate = 1.02 in/hr)**



**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%

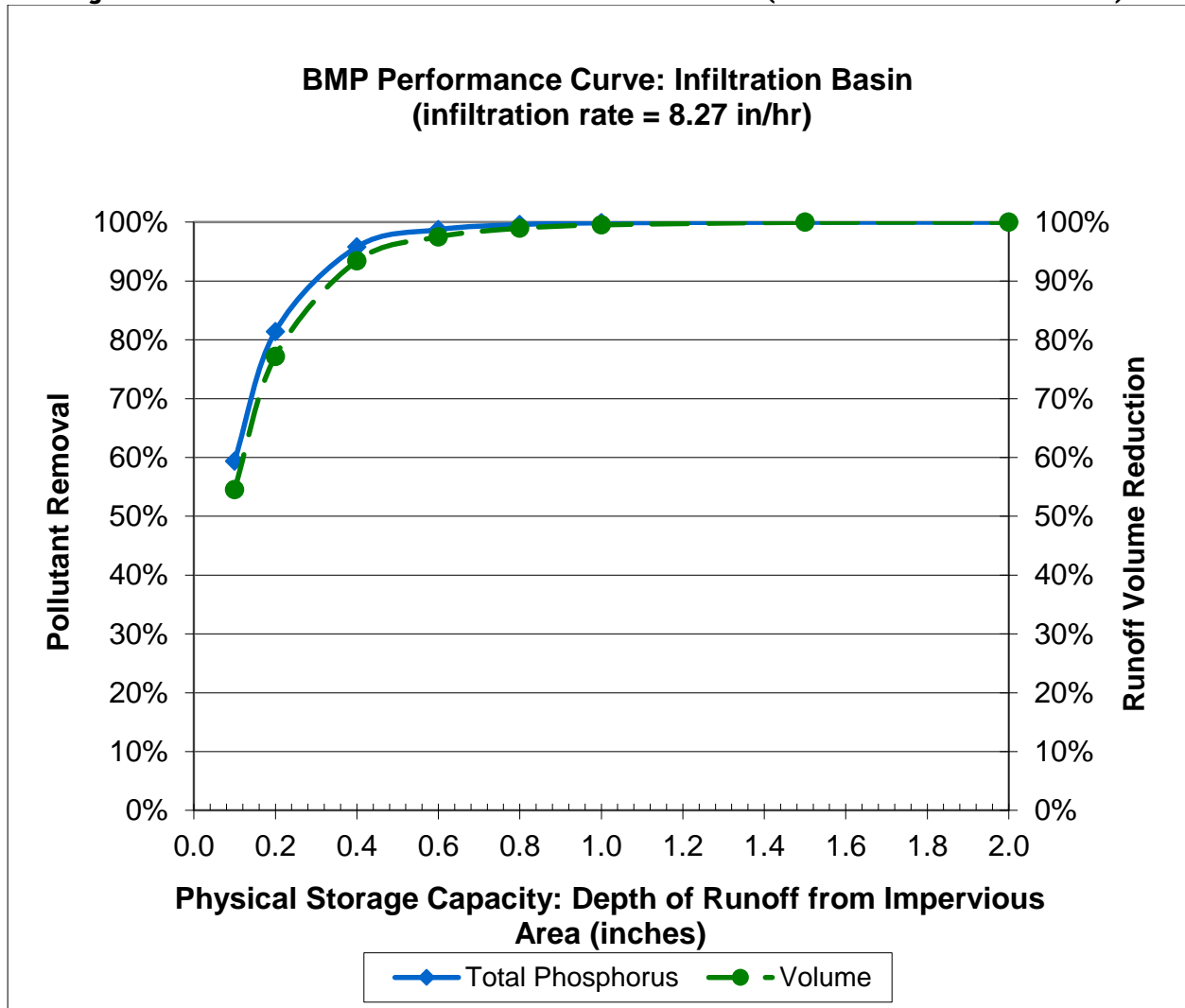
**Figure 3- 11: BMP Performance Curve: Infiltration Basin (infiltration rate = 2.41 in/hr)**



**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%

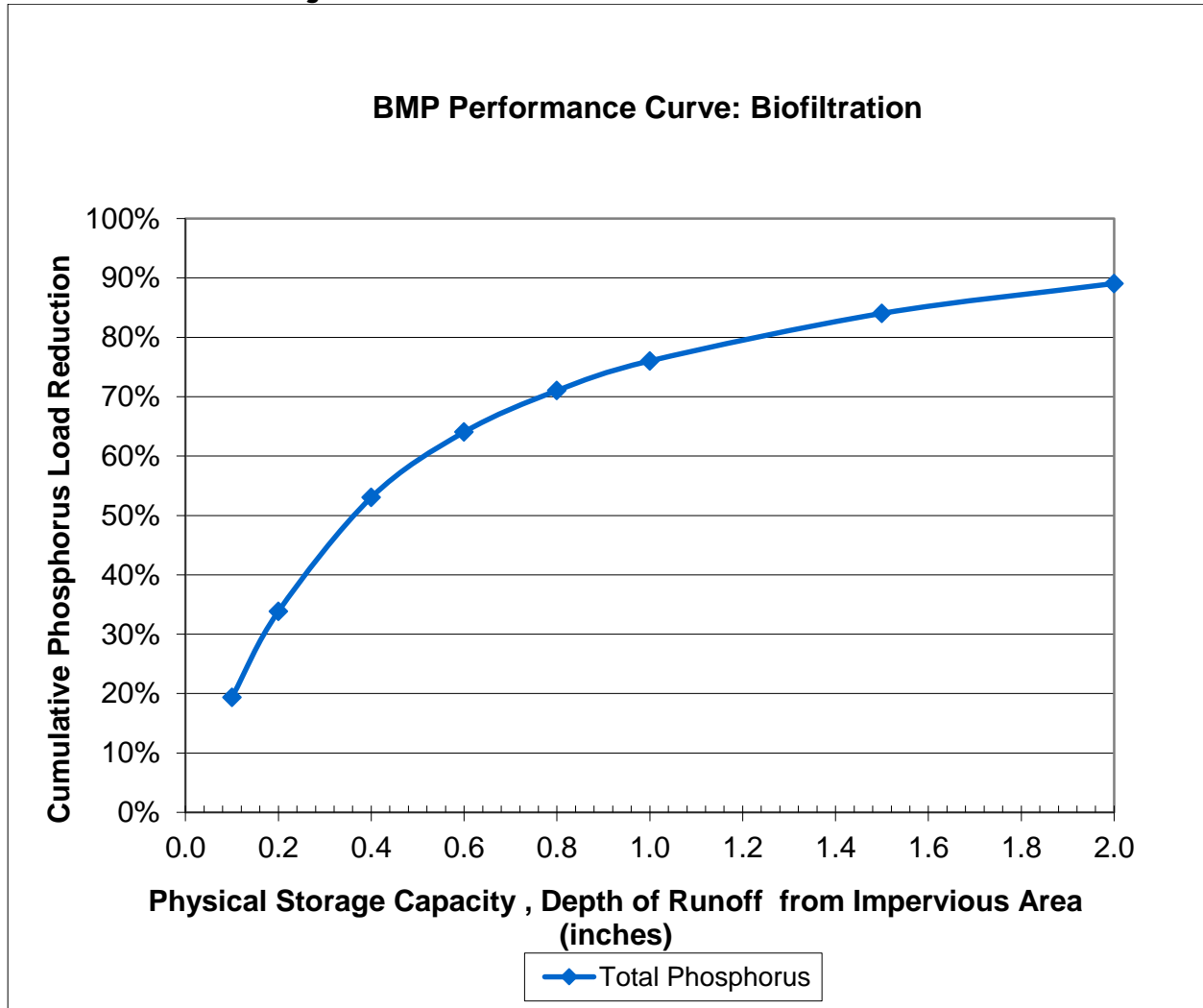
**Figure 3- 12: BMP Performance Curve: Infiltration Basin (infiltration rate = 8.27 in/hr)**



**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%

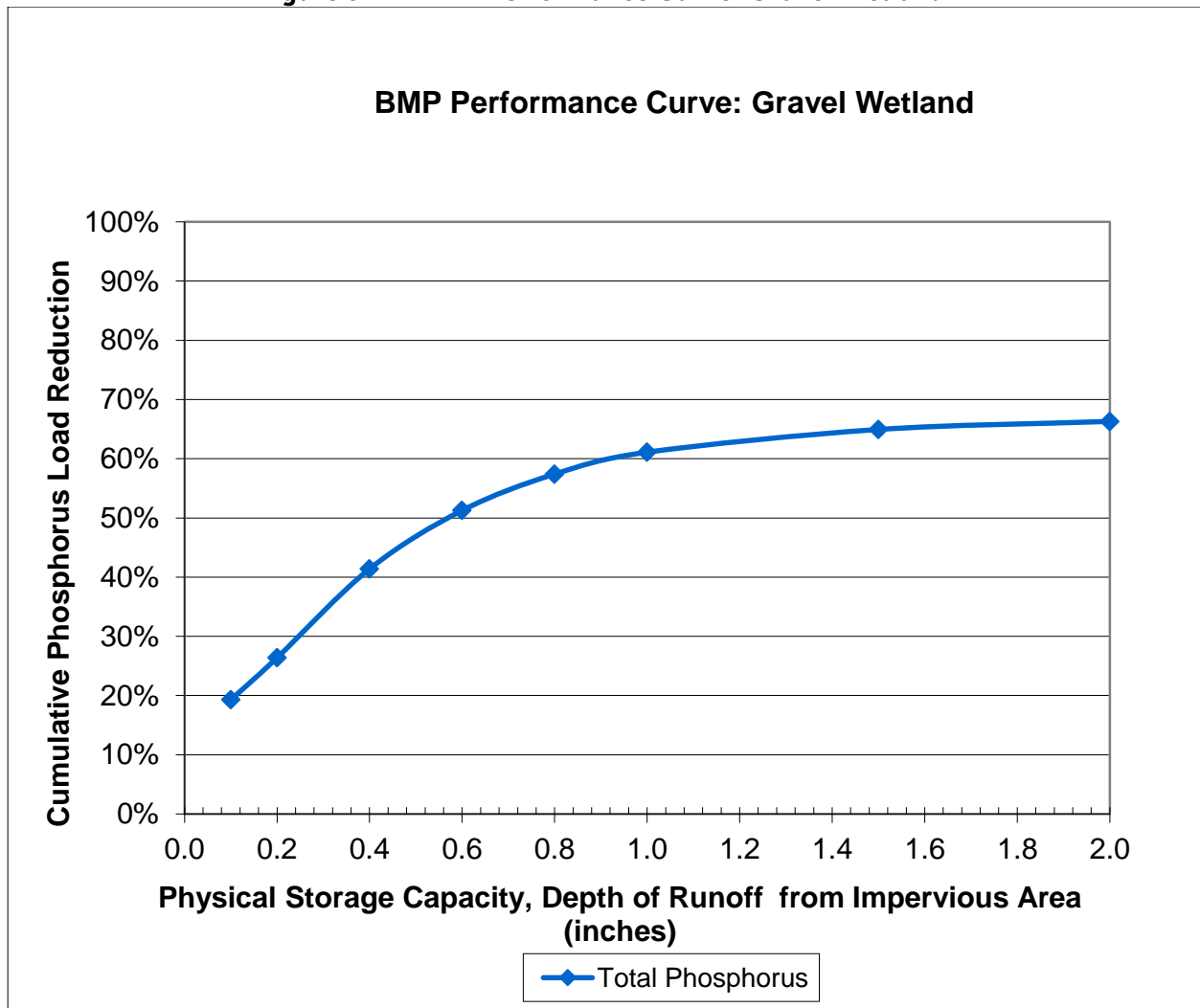
**Figure 3- 13: BMP Performance Curve: Biofiltration**



**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%

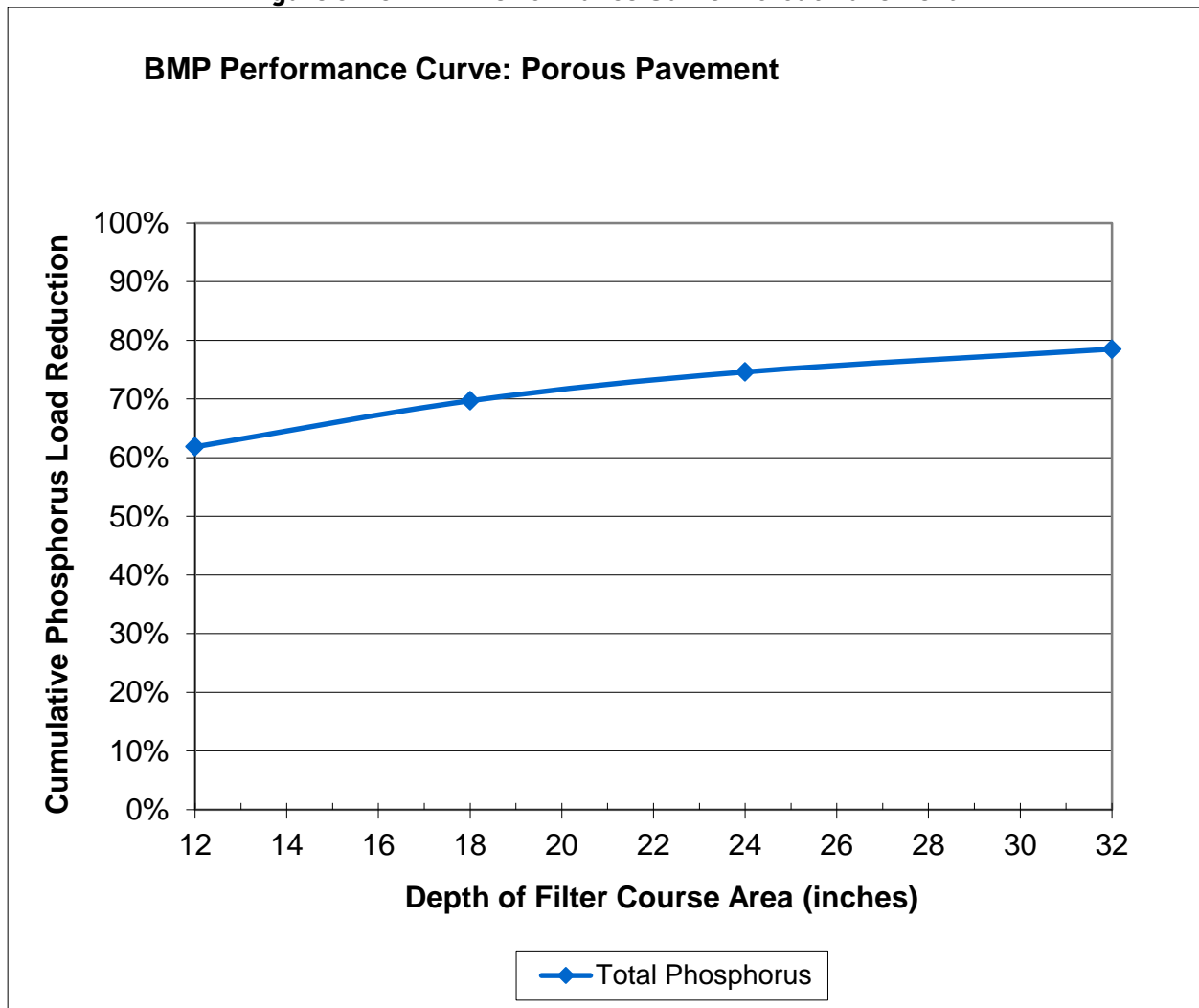
**Figure 3- 14: BMP Performance Curve: Gravel Wetland**



**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**





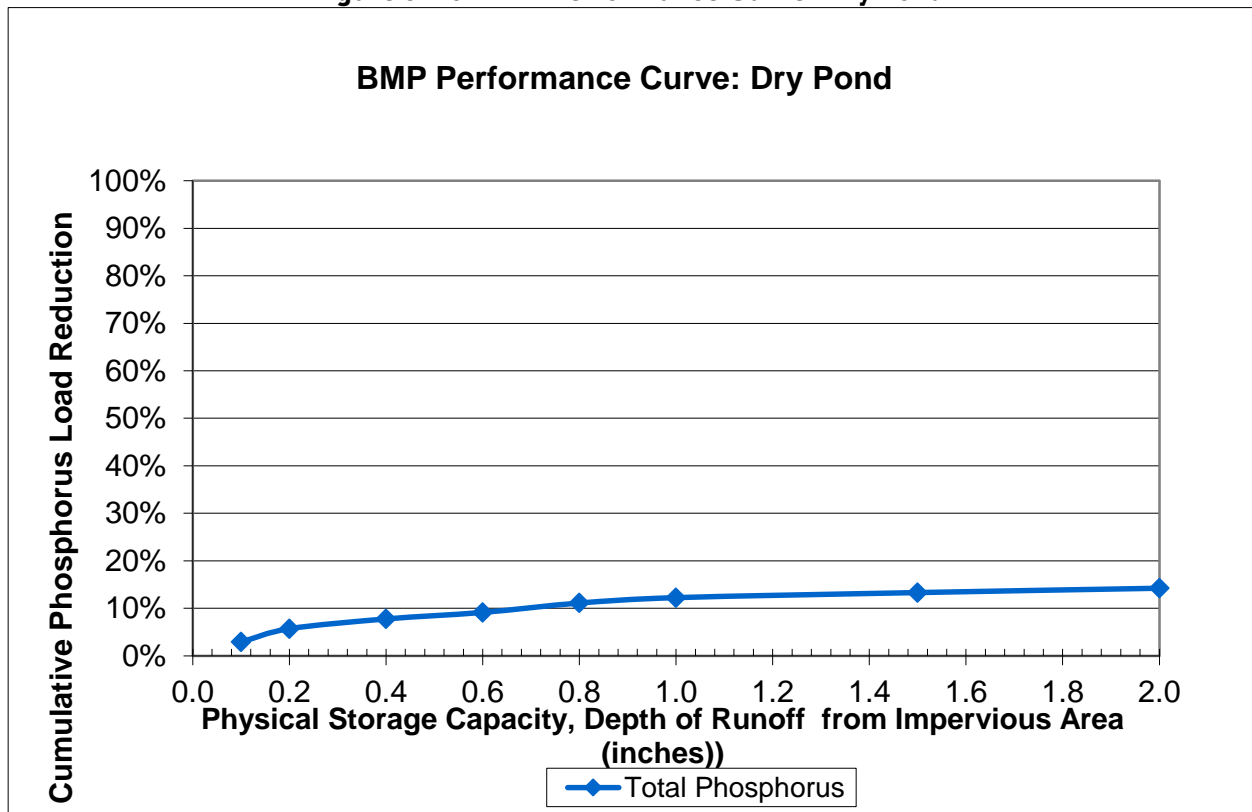
**Table 3- 19: Wet Pond BMP Performance Table**

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%

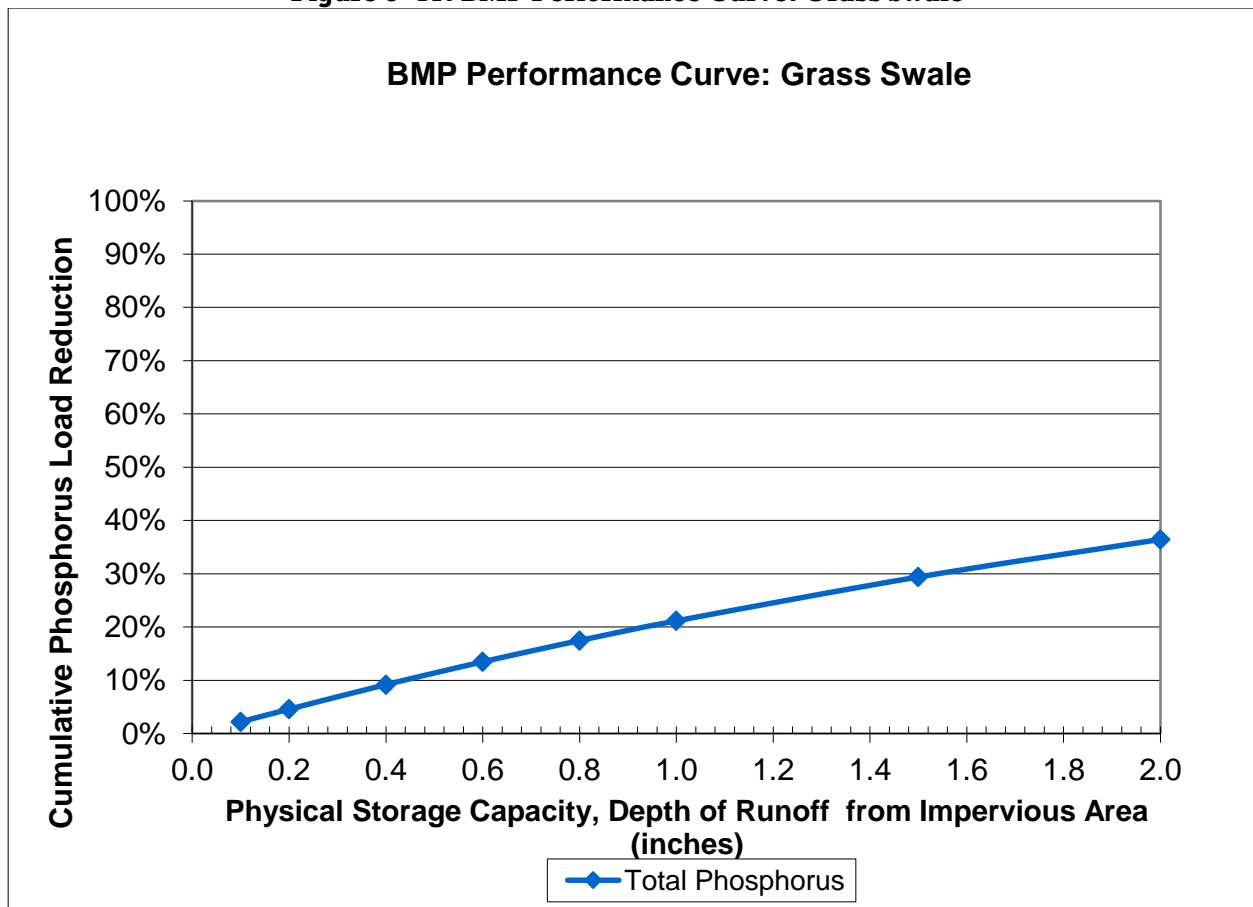
**Figure 3- 16: BMP Performance Curve: Dry Pond**



**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%

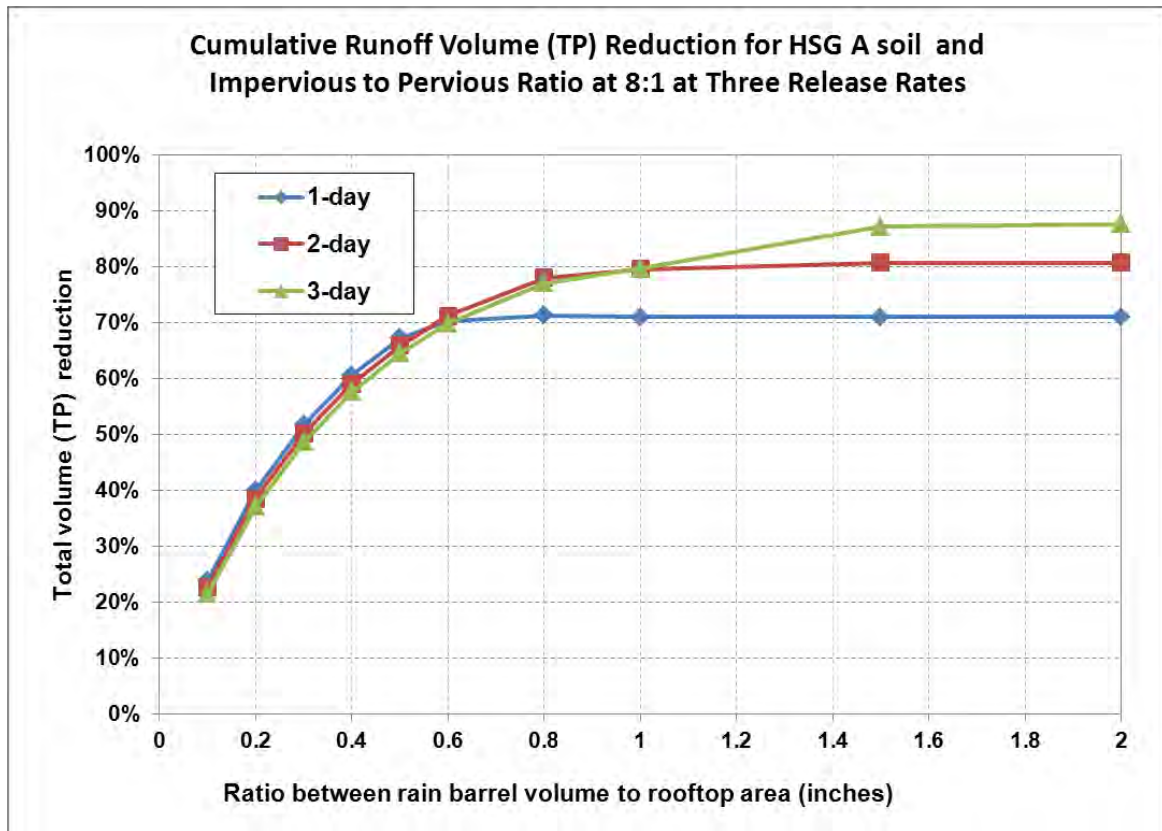
**Figure 3- 17: BMP Performance Curve: Grass Swale**



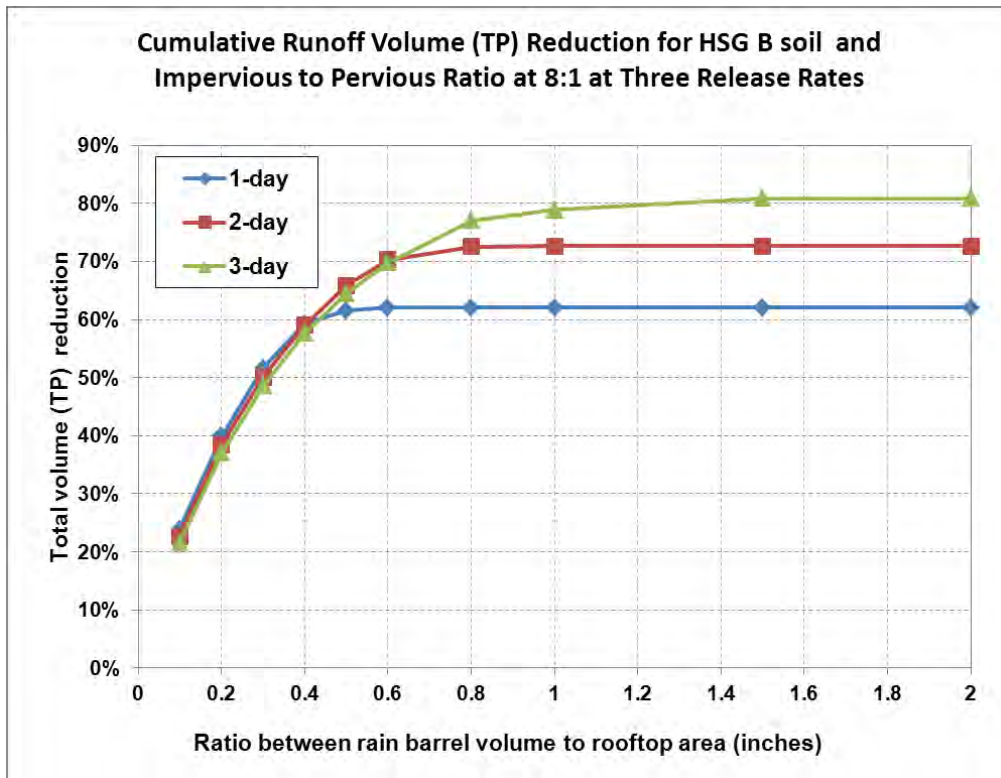
**Table 3- 22: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1**

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%

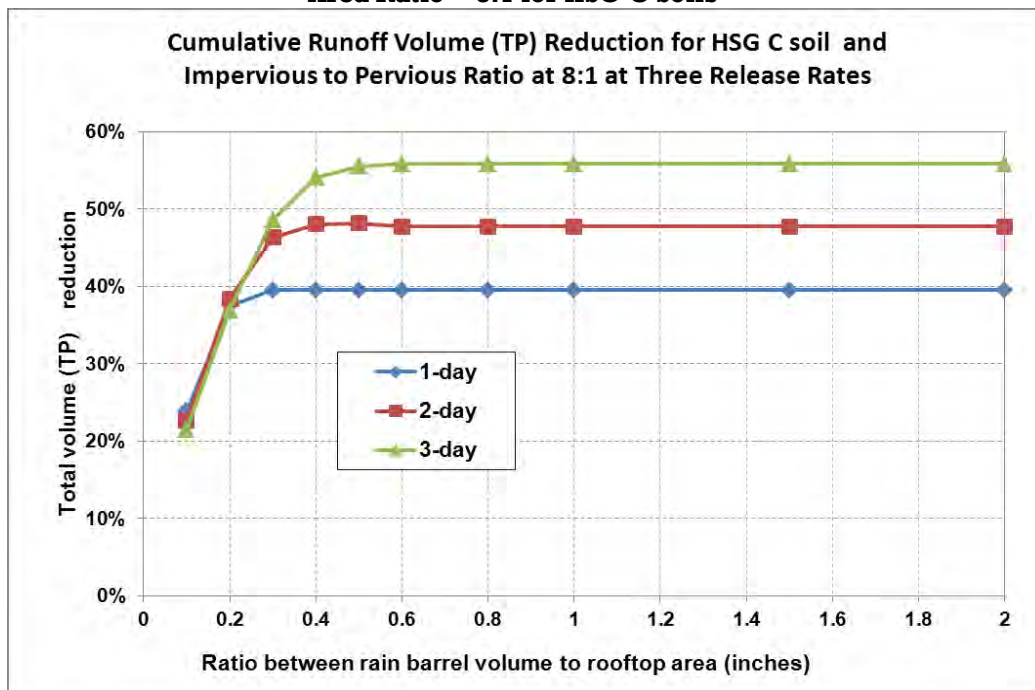
**Figure 3- 18: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1 for HSG A Soils**



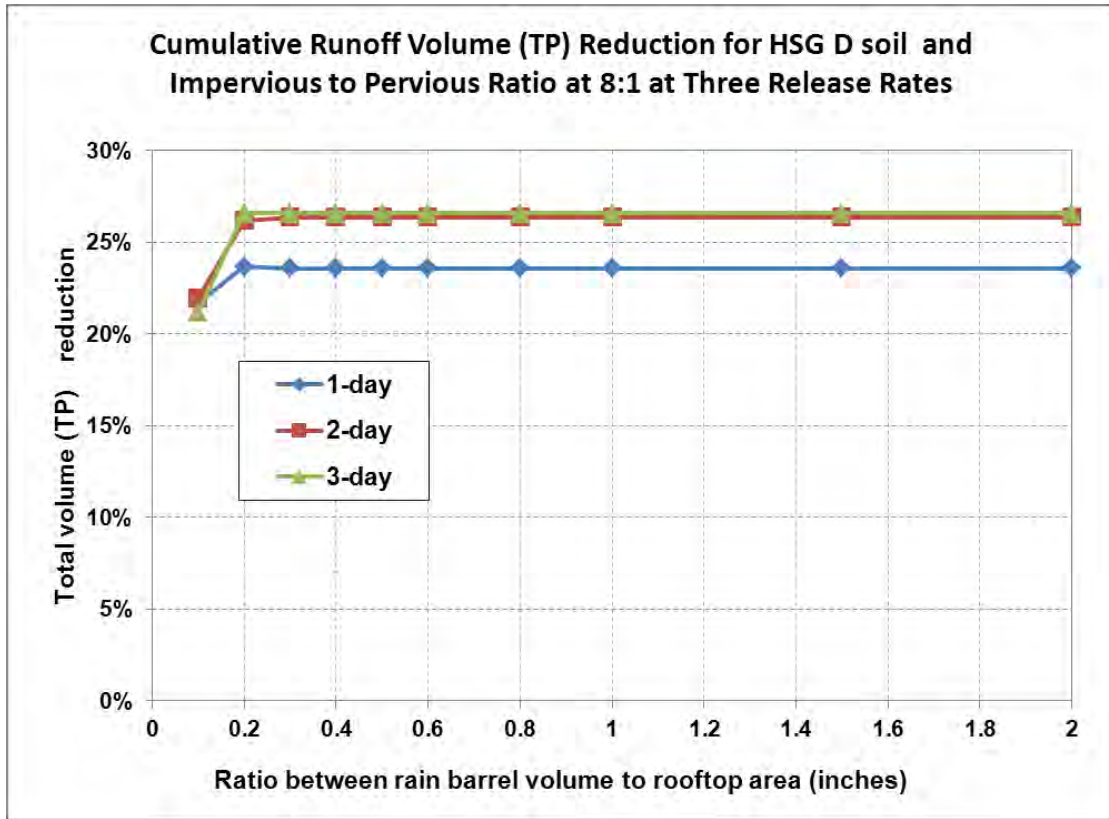
**Figure 3- 19: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1 for HSG B Soils**



**Figure 3- 20: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1 for HSG C Soils**



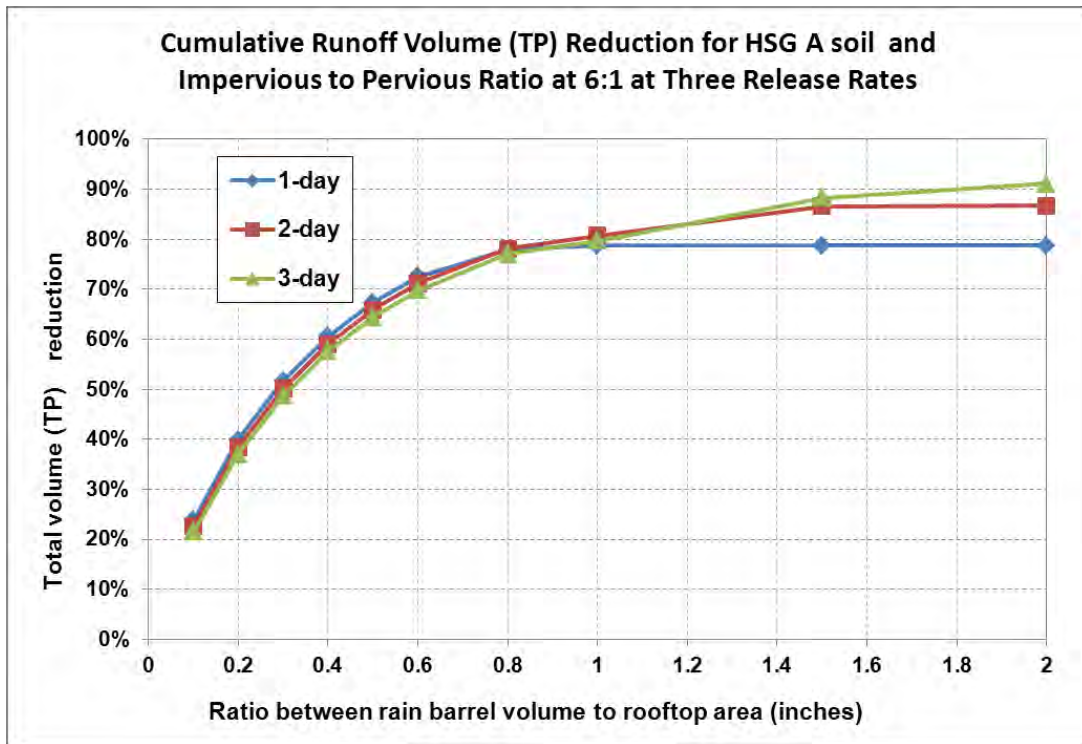
**Figure 3- 21: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1 for HSG D Soils**



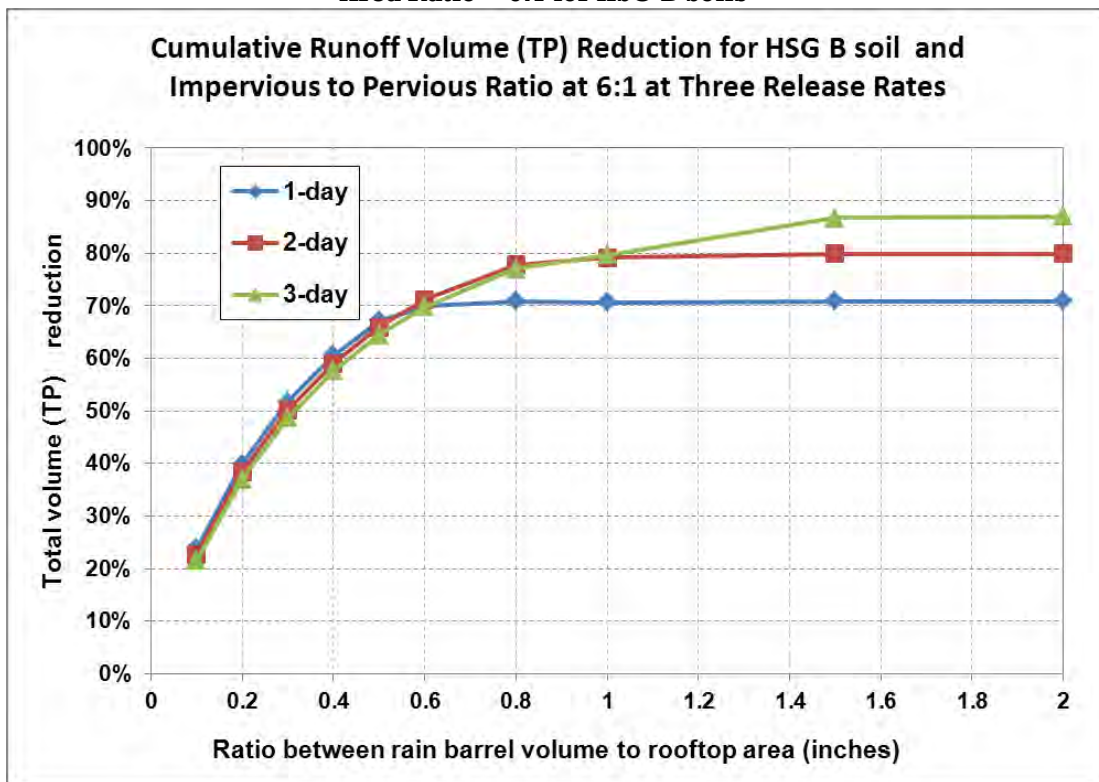
**Table 3- 23: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1**

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%

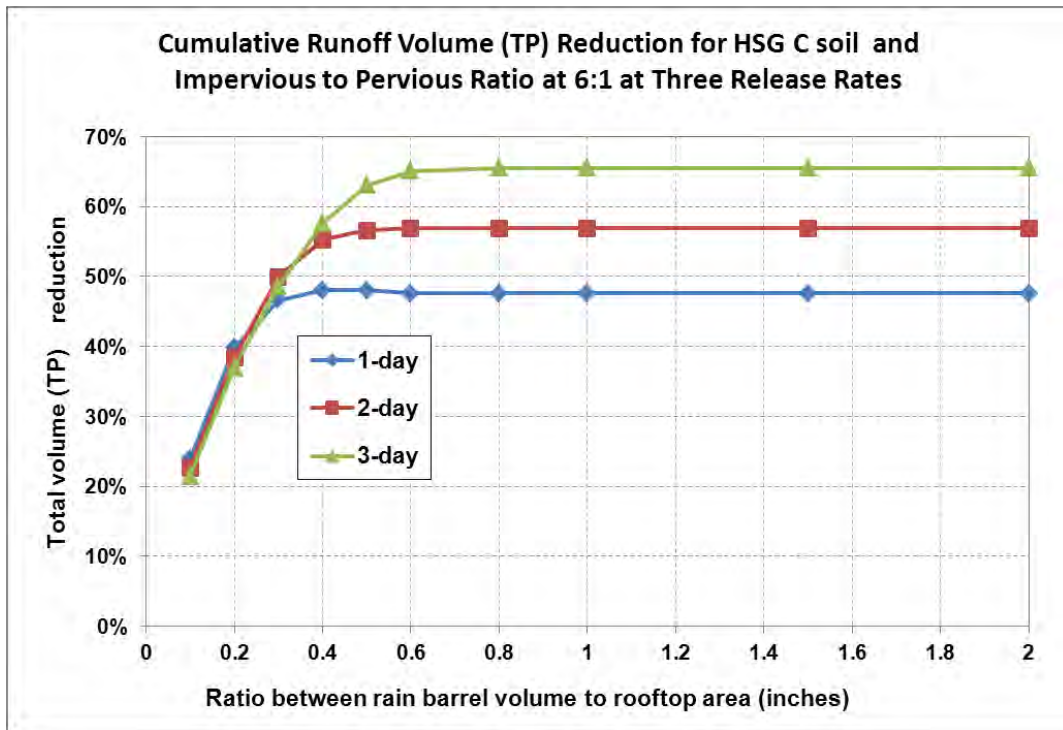
**Figure 3- 22: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1 for HSG A Soils**



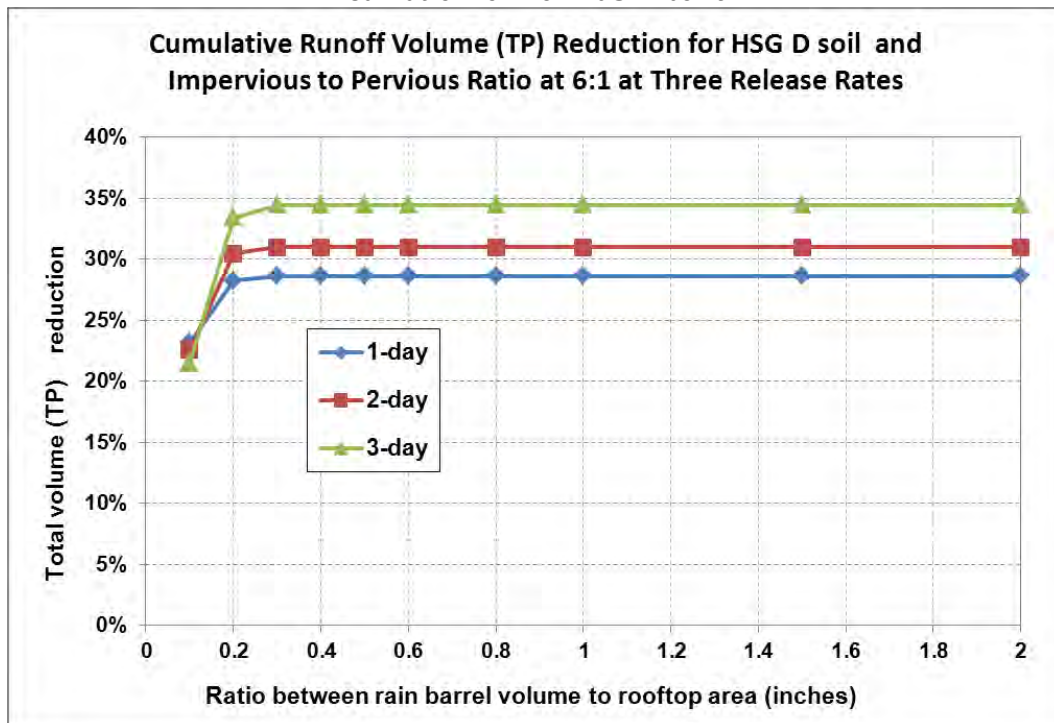
**Figure 3- 23: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1 for HSG B Soils**



**Figure 3- 24: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1 for HSG C Soils**



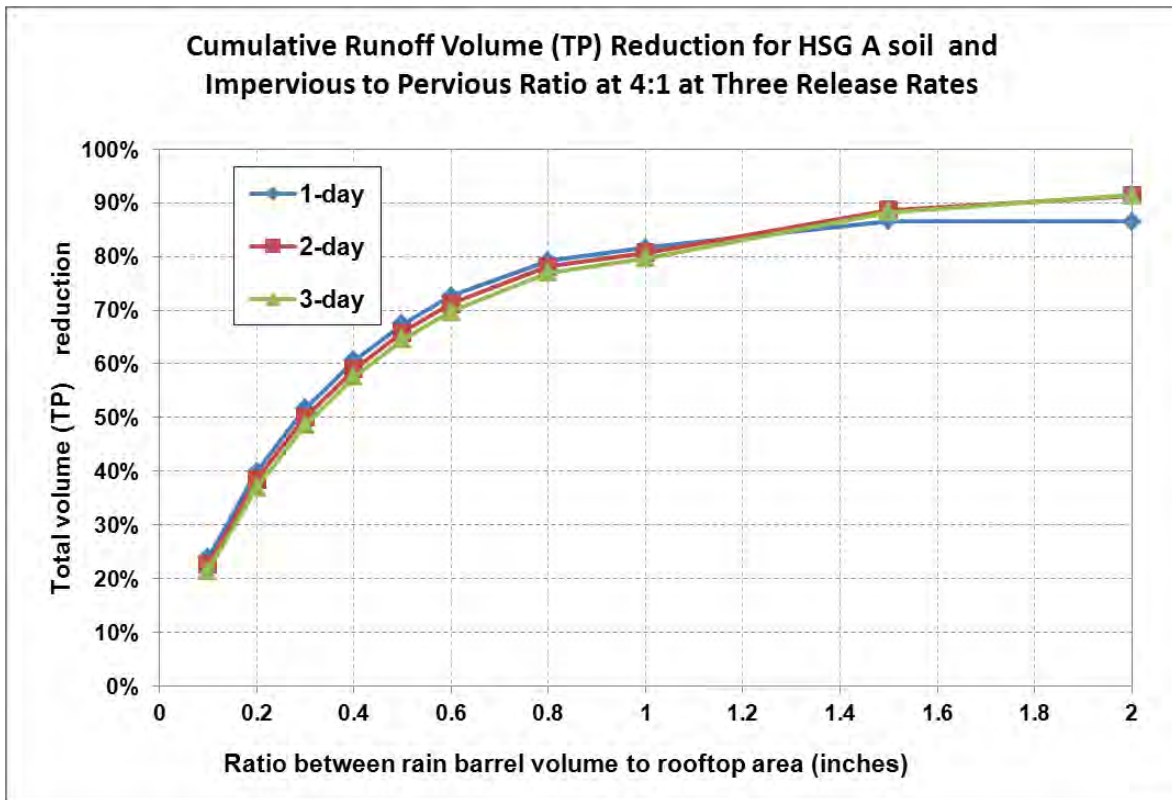
**Figure 3- 25: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1 for HSG D Soils**



**Table 3- 24: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1**

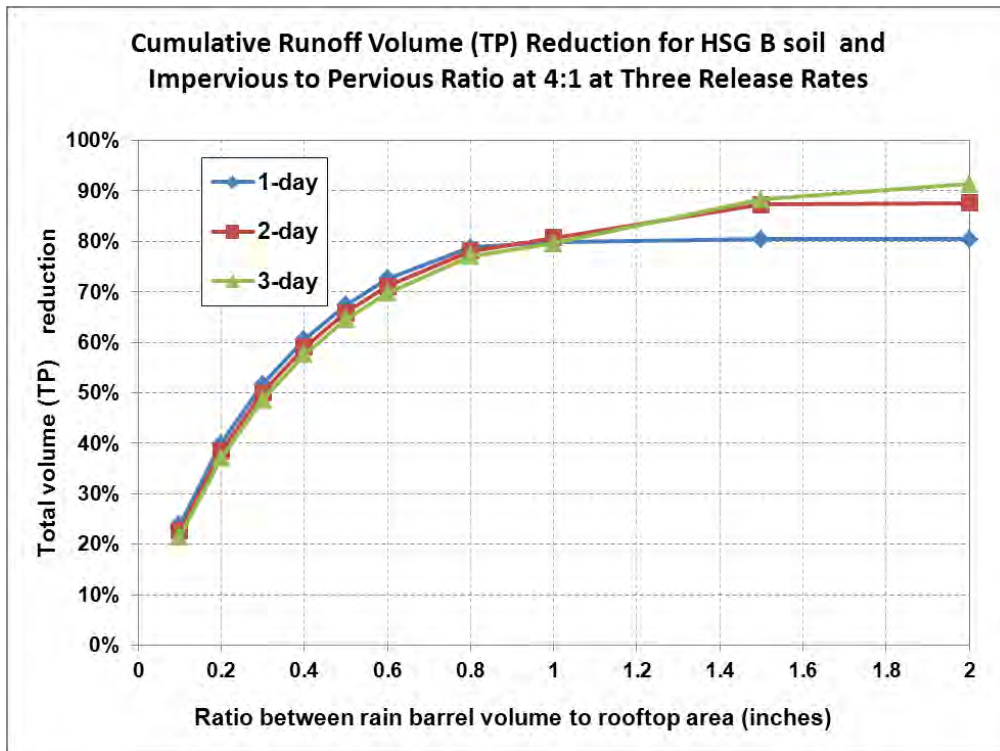
Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1												
Storage volume to impervious area ratio	Total Runoff Volume and Phosphorus Load (TP) Reduction Percentages											
	HSG A			HSG B			HSG C			HSG D		
	1-day	2-day	3-day	1-day	2-day	3-day	1-day	2-day	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**

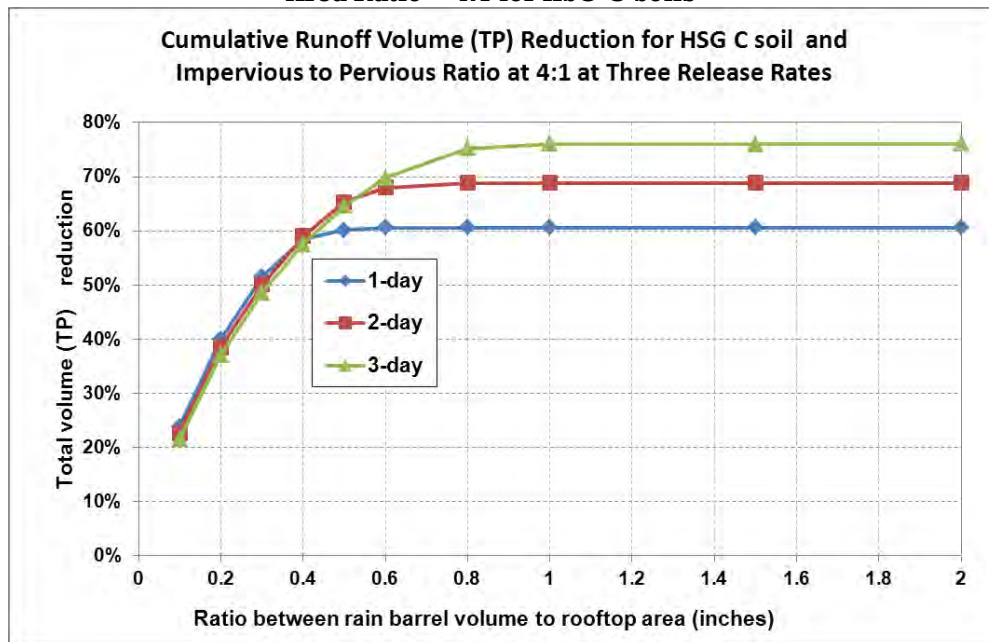




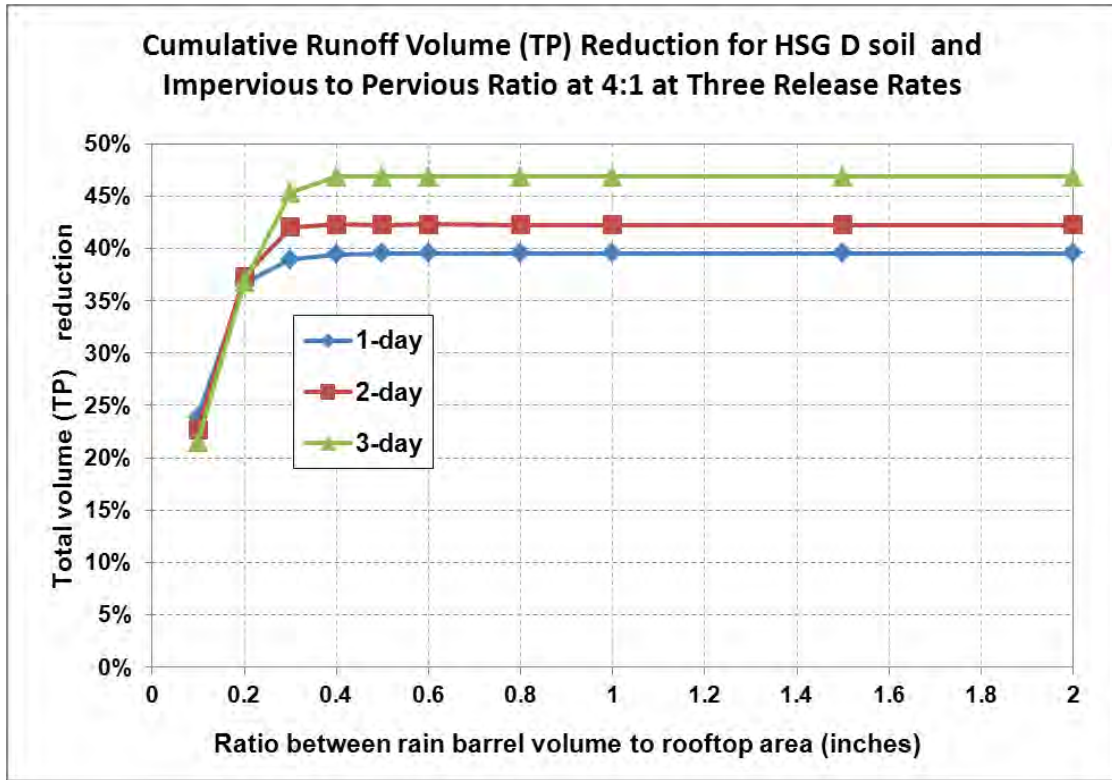
**Figure 3- 27: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1 for HSG B Soils**



**Figure 3- 28: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1 for HSG C Soils**



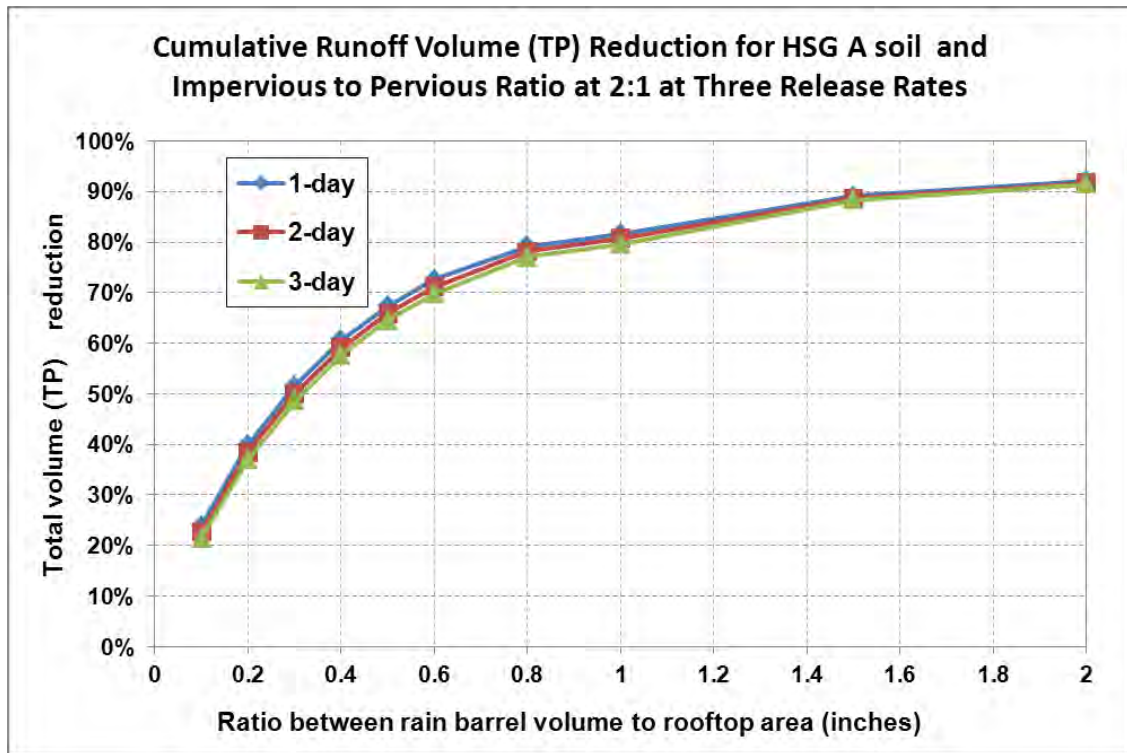
**Figure 3- 29: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1 for HSG D Soils**



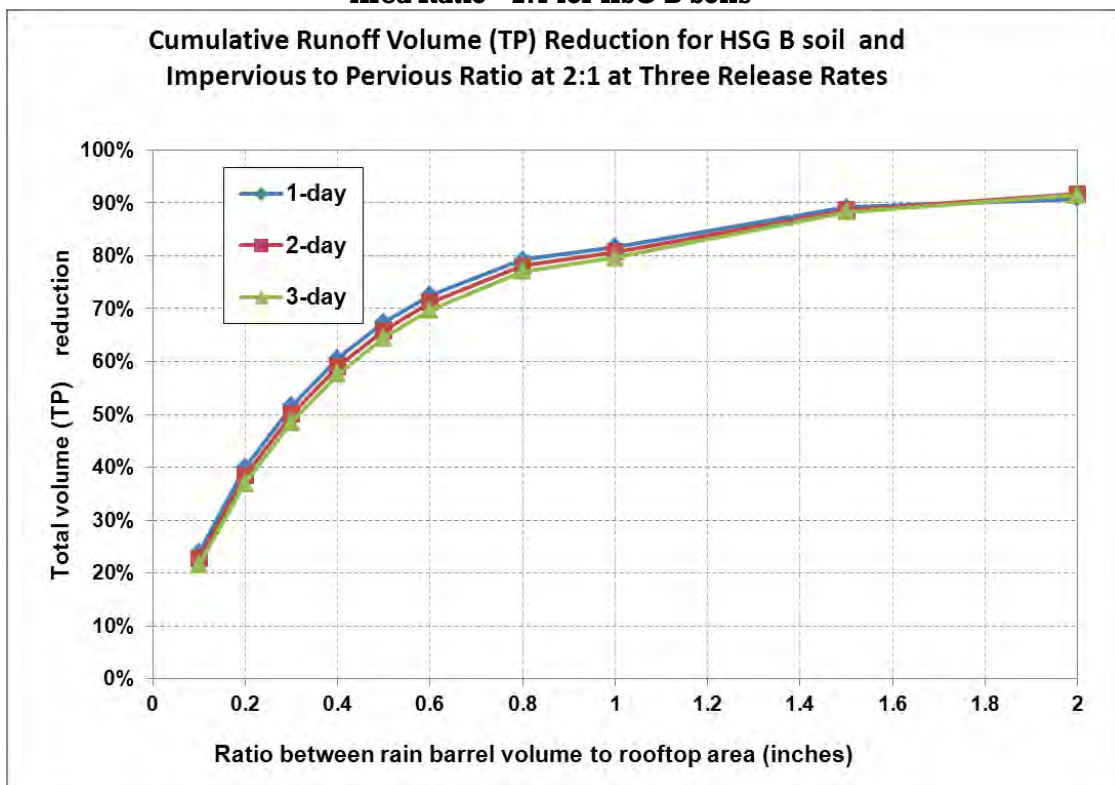
**Table 3- 25: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 2:1**

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%

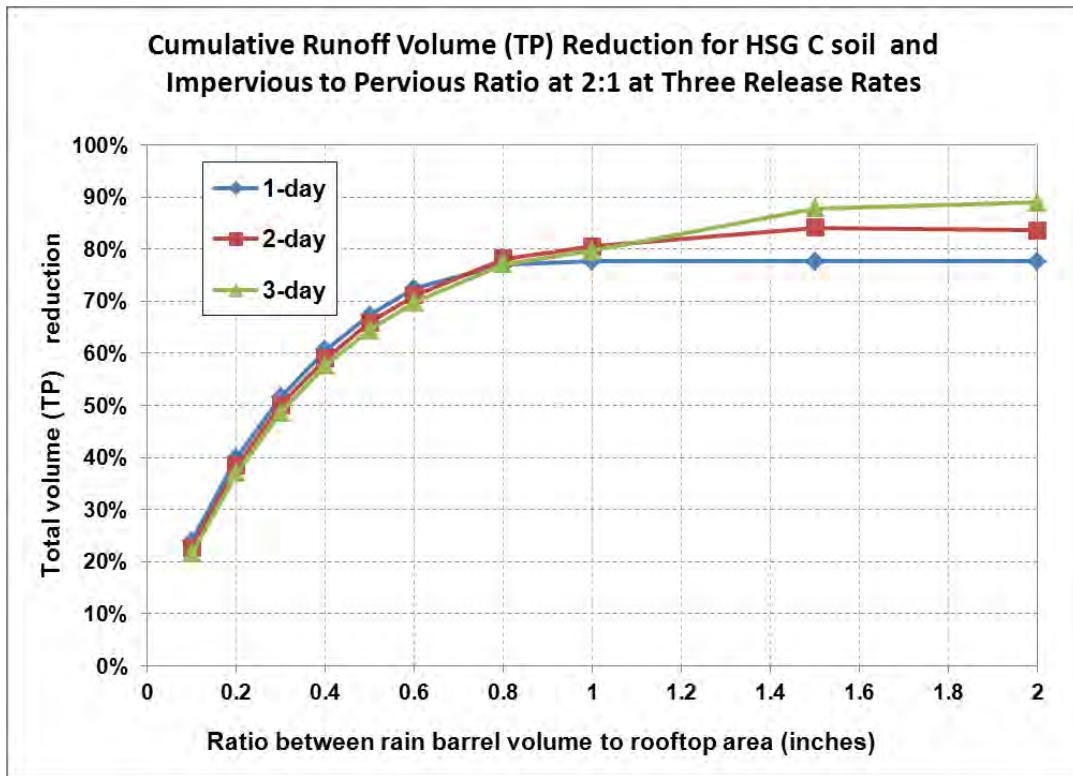
**Figure 3- 30: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio= 2:1 for HSG A Soils**



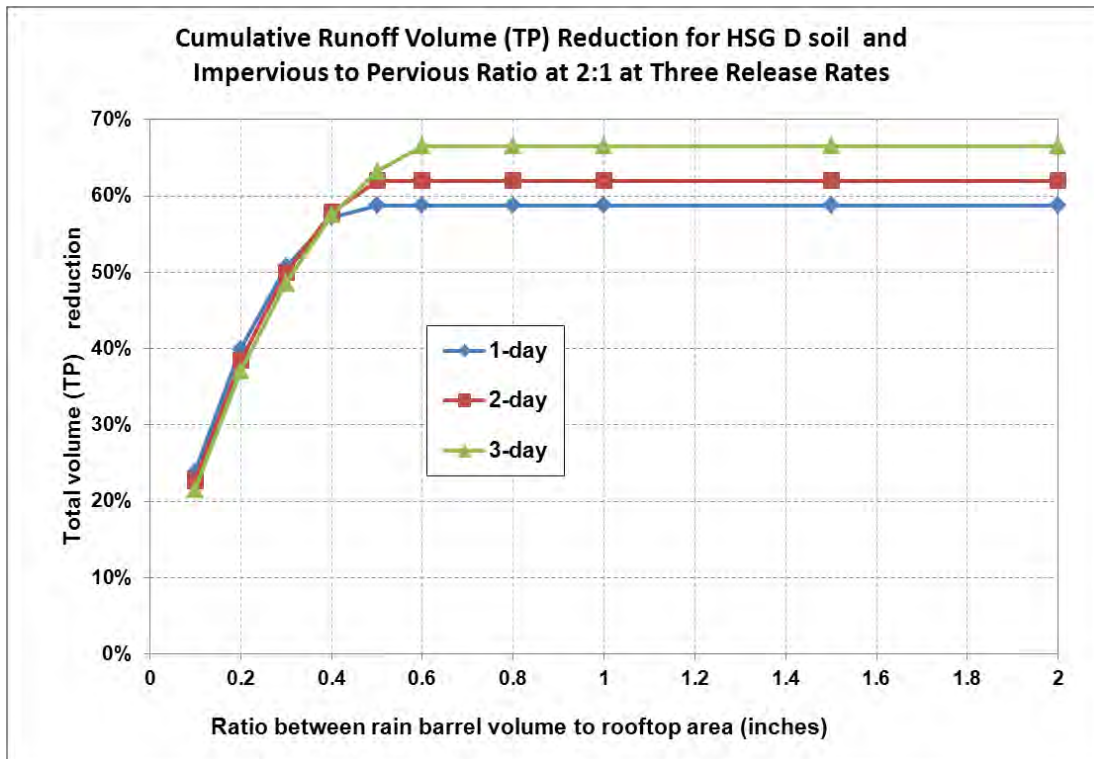
**Figure 3- 31: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio= 2:1 for HSG B Soils**



**Figure 3- 32: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio= 2:1 for HSG C Soils**



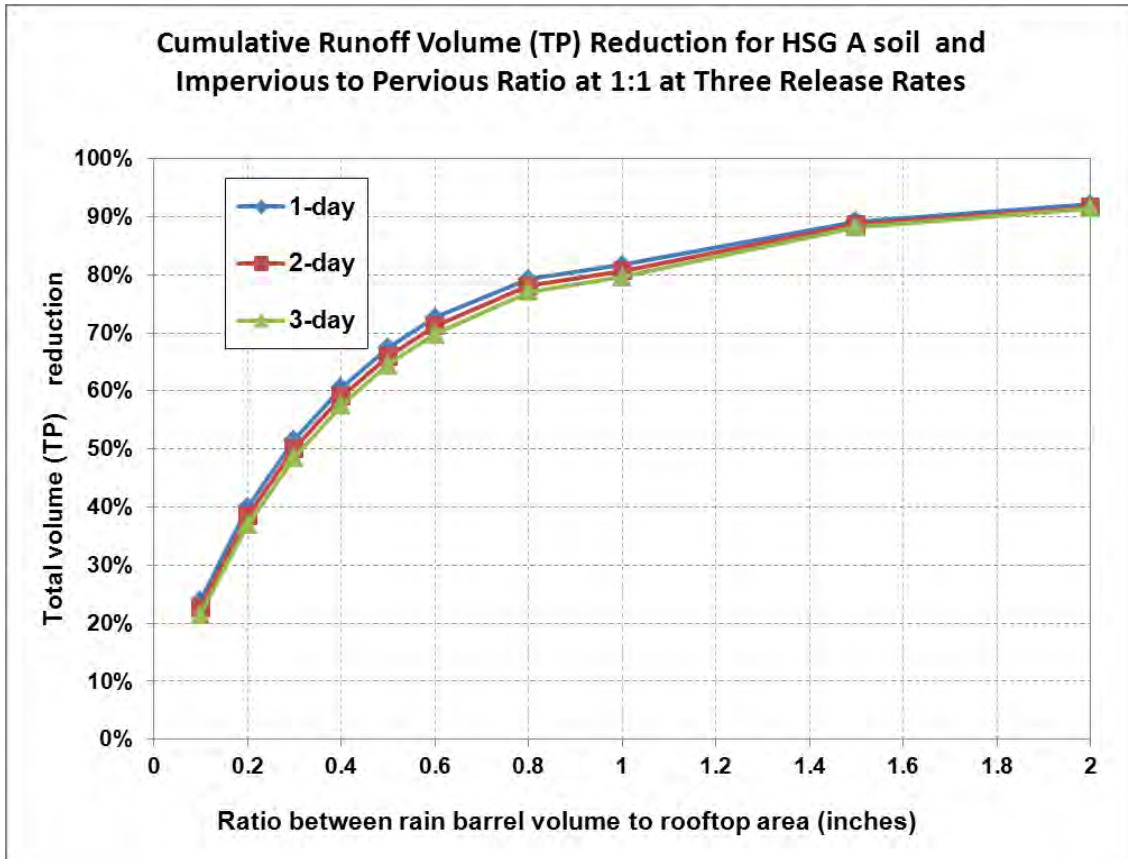
**Figure 3- 33: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio= 2:1 for HSG D Soils**



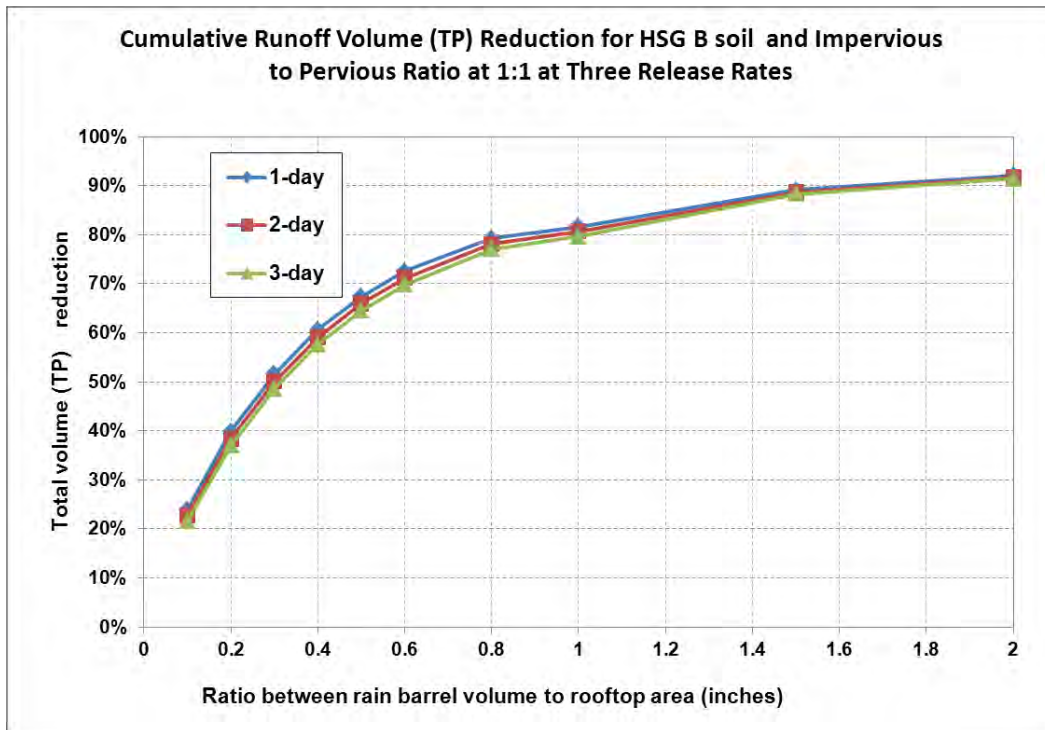
**Table 3- 26: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1**

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%

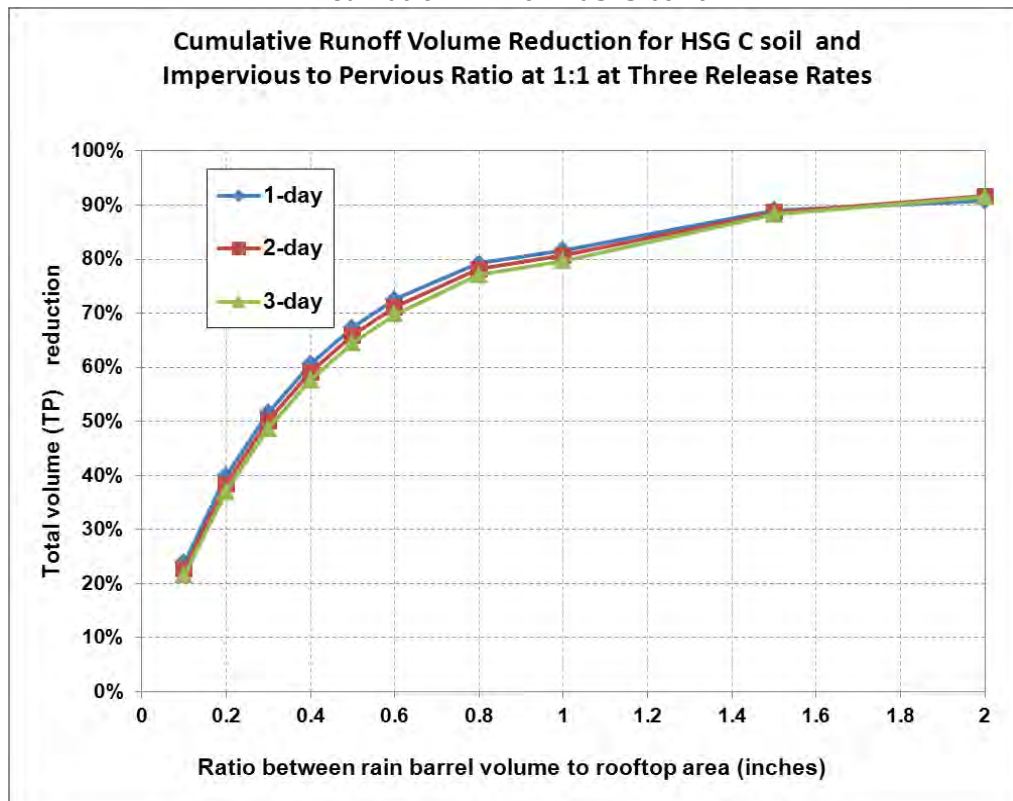
**Figure 3- 34: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1 for HSG A Soils**



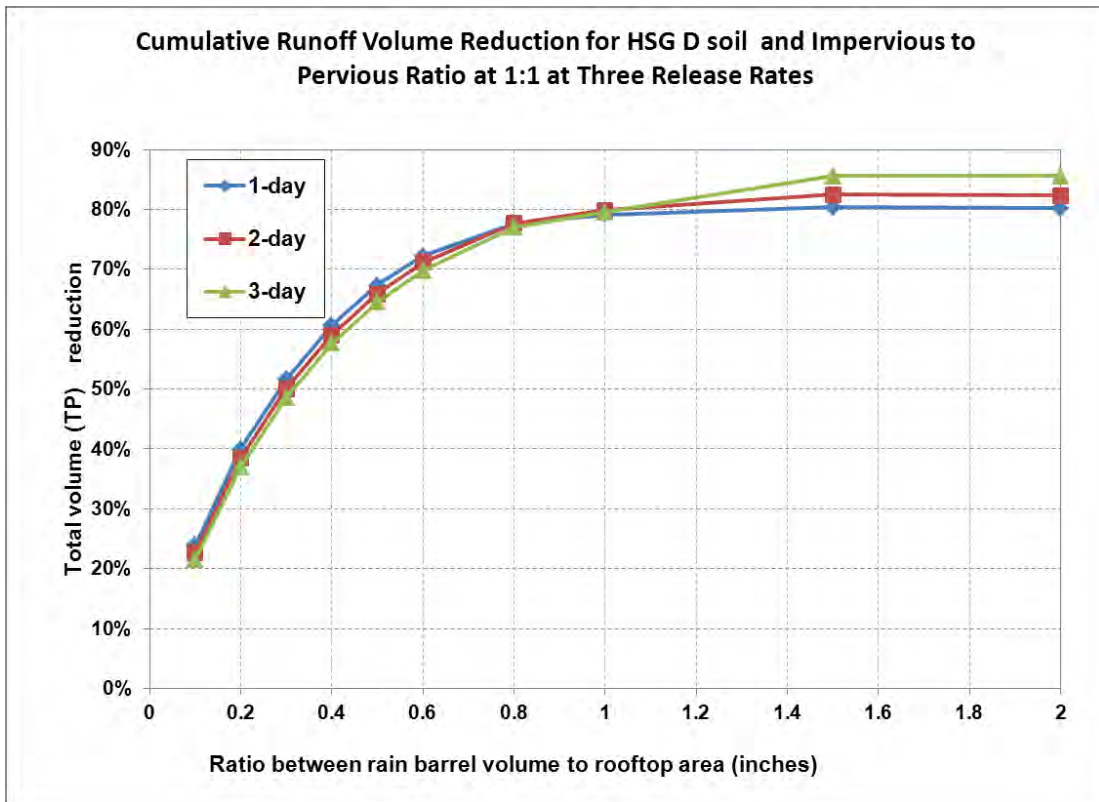
**Figure 3- 35: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1 for HSG B Soils**



**Figure 3- 36: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1 for HSG C Soils**



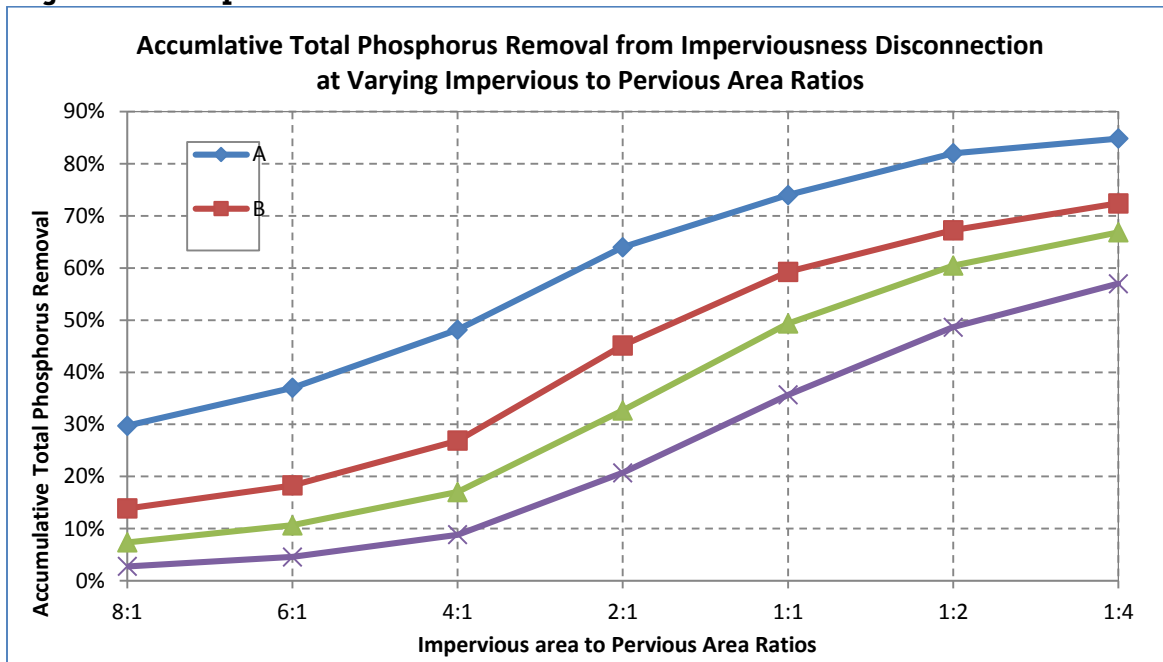
**Figure 3- 37: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1 for HSG D Soils**



**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 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.

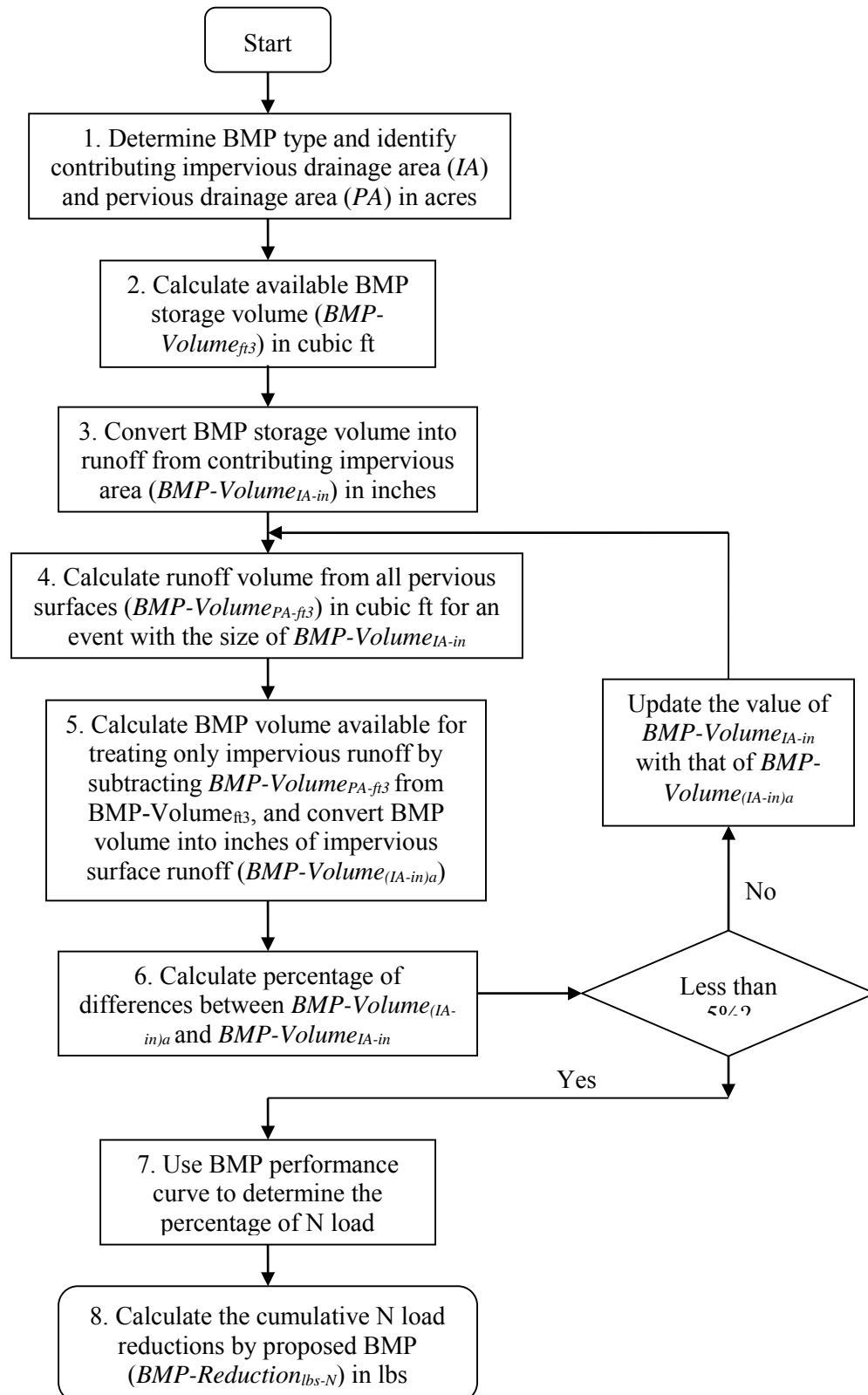
First, the BMP Load is determined as specified in Example 1:

$$\begin{aligned} \text{BMP Load} &= \text{IA (acre)} \times 14.1 \text{ lb/ac/yr} \\ &= 1.49 \text{ acres} \times 14.1 \text{ lbs/acre/yr} \\ &= 21.0 \text{ lbs/yr} \end{aligned}$$

$$\text{BMP Reduction}_{\text{lbs-N}} = \text{BMP Load} \times (\text{BMP Reduction}_{\text{\%-N}}/100) \text{ (Equation 2)}$$

$$\begin{aligned} \text{BMP Reduction}_{\text{lbs-N}} &= 21 \text{ lbs/yr} \times (61/100) \\ &= \mathbf{12.8 \text{ lbs/yr}} \end{aligned}$$

**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 (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 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>)*i*</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>)*i*</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>)*i*</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>)*i*</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)1</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>)2...*n*</sub>, determined in step 5a below, into inches of runoff from the contributing impervious area (BMP Volume<sub>(IA-in)2...*n*</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):

$$\text{BMP-Volume }_{(IA-ft^3)2} = ((\text{BMP-Volume}_{ft^3} - \text{BMP Volume }_{(PA-ft^3)1}) \quad \text{(Equation 8)}$$

$$\text{BMP-Volume }_{(IA-in)2} = (\text{BMP-Volume }_{(IA-ft^3)2}/IA \text{ (acre)}) \times (12 \text{ in/ft} \times 1 \text{ acre}/43,560 \text{ ft}^2)$$

**(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 ( $\text{ft}^3$ ) 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 using the information from Table 2 and equation 7.

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:

$$\begin{aligned}\text{BMP Volume }_{(\text{IA-ft}^3)2} &= 48,155 \text{ ft}^3 - 5052 \text{ ft}^3 \\ &= 43,103 \text{ ft}^3\end{aligned}$$

$$\begin{aligned}\text{BMP Volume }_{(\text{IA-in})2} &= (43,103 \text{ ft}^3/11.75 \text{ acre}) \times (12 \text{ in/ft} \times 1 \text{ acre}/43,560 \text{ ft}^2) \\ &= 1.01 \text{ in}\end{aligned}$$

**6-1)** The % difference between BMP Volume  $_{(\text{IA-in})2}$ , 1.01 in, and BMP Volume  $_{(\text{IA-in})1}$ , 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  $_{(\text{IA-in})2} = 1.01 \text{ in}$ .

**Solution Iteration 2**

$$\begin{aligned}\text{4-2) BMP-Volume }_{(\text{PA-ft}^3)2} &= ((3.84 \text{ acre} \times 0.21 \text{ in}) + (0.96 \text{ acre} \times 0.12 \text{ in})) \times 3,630 \text{ ft}^3/\text{acre-in} \\ &= 3,358 \text{ ft}^3\end{aligned}$$

$$\begin{aligned}\text{5-2) BMP-Volume }_{(\text{IA-ft}^3)3} &= 48,155 \text{ ft}^3 - 3,358 \text{ ft}^3 \\ &= 44,797 \text{ ft}^3\end{aligned}$$

$$\begin{aligned}\text{BMP-Volume }_{(\text{IA-in})3} &= (44,797 \text{ ft}^3/11.75 \text{ acre}) \times (12 \text{ in/ft} \times 1 \text{ acre}/43,560 \text{ ft}^2) \\ &= 1.05 \text{ in}\end{aligned}$$

$$\begin{aligned}\text{6-2) \% Difference} &= ((1.05 \text{ in} - 1.01 \text{ in})/1.05 \text{ in}) \times 100 \\ &= 4\%\end{aligned}$$

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%.

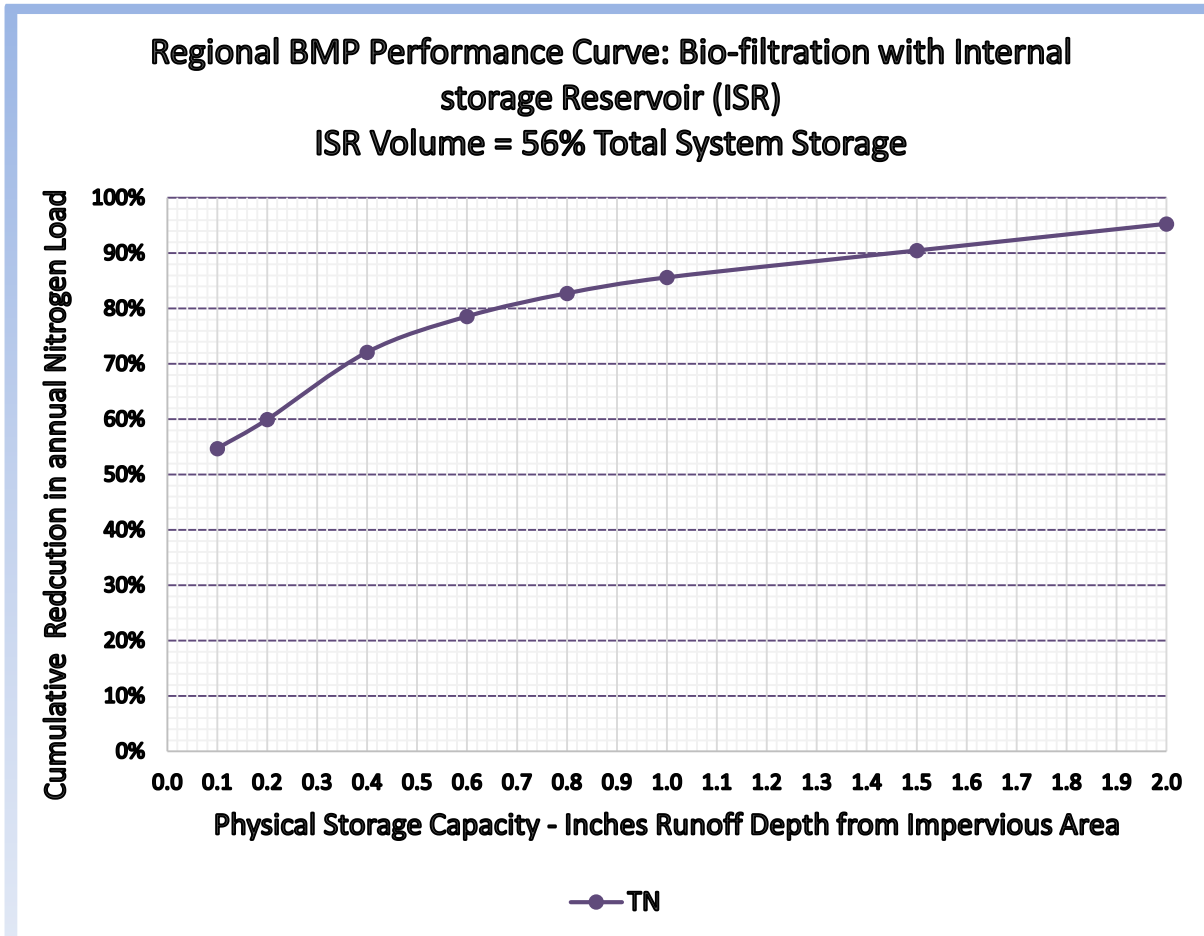
$$\text{BMP-Reduction}_{\text{lbs-N}} = \text{BMP N Load} \times (\text{N}_{\text{target}} / 100) \quad \text{(Equation 11)}$$

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)**

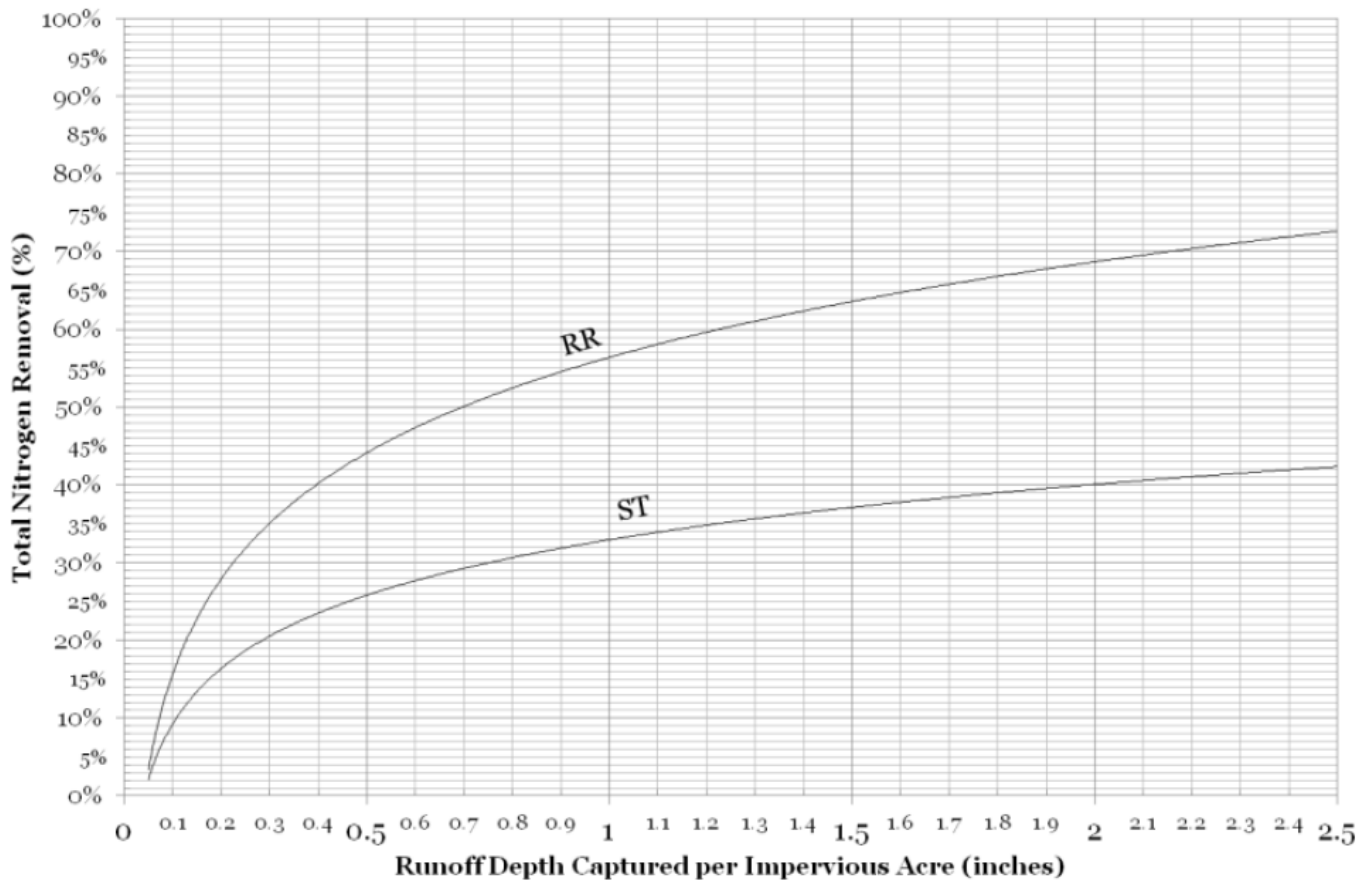


**Table 3. Classification of BMP to Determine Nitrogen Reduction<sup>1</sup>**

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



# 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 (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 (web address or physical location, if already completed):

### 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> <small>(Part II, III, IV or V, Subpart B.3.(b.) of 2003 permit)</small>	<input type="text" value="Yes"/>	Effective Date or Estimated Date of Adoption (MM/DD/YY):	<input type="text" value="07/30/03"/>
<b>Construction/Erosion and Sediment Control (ESC) Authority Adopted?</b> <small>(Part II, III, IV or V, Subpart B.4.(a.) of 2003 permit)</small>	<input type="text" value="Yes"/>	Effective Date or Estimated Date of Adoption (MM/DD/YY):	<input type="text" value="10/15/07"/>
<b>Post- Construction Stormwater Management Adopted?</b> <small>(Part II, III, IV or V, Subpart B.5.(a.) of 2003 permit)</small>	<input type="text" value="Yes"/>	Effective Date or Estimated Date of Adoption (MM/DD/YY):	<input type="text" value="10/15/07"/>



Waterbody segment that receives flow from the MS4	Number of outfalls into receiving water segment	Chloride	Chlorophyll-a	Dissolved Oxygen/DO Saturation	Nitrogen	Oil & Grease/ PAH	Phosphorus	Solids/TSS/Turbidity	E. coli	Enterococcus	Other pollutant(s) causing impairments
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		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						

## 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

BMP Media/Category (enter your own text to override the drop down menu)	BMP Description	Targeted Audience	Responsible Department/Parties (enter your own text to override the drop down menu)	Measurable Goal	Beginning Year of BMP Implementation
Brochures/Pamphlets	Get the word out to the residential population to be mindful of what is dumped on the ground and down catch basins. Dispose of dog waste properly. Have links to Storm Water videos available on Town Website.	Residents	DPW Operations	Count the number of waste fliers distributed with dog licenses. Count the website hits to links to videos about storm water contamination. Note the number of notices sent out annually with quarterly Town Newsletter.	2019
Brochures/Pamphlets	Get the word out to the commercial population to be mindful of what is dumped down sinks, toilets and down catch basins. Be mindful of grease traps. Have links to Storm Water videos available on Town Website.	Businesses, Institutions and Commercial Facilities	Health Department	Count the number of notices sent out annually. Count the website hits to links to videos about storm water contamination.	2019

<p>Meeting</p>	<p>Explain to developers of our storm water regulations. Enforce these bylaws during and after construction. Have links to Storm Water videos available on Town Website.</p>	<p>Developers (construction)</p>	<p>Building Permitting and Enforcement</p>	<p>To control all runoff from developments and construction sites during and after construction. Count the website hits to links to videos about storm water contamination. Count # of permit issued.</p>	<p>2019</p>
<p>Brochures/Pamphlets</p>	<p>Get the word out to the industrial population to be mindful of what is dumped down sinks, toilets and down catch basins. Be mindful of process water and where it is discharged if applicable. Have links to Storm Water videos available on Town Website.</p>	<p>Industrial Facilities</p>	<p>Health Department</p>	<p>Make sure all of our Industrial facilities receive annual notices about what is discharged down sink, toilets, catch basins and what is done with any process water. Count the website hits to links to videos about storm water contamination.</p>	<p>2019</p>
<p>Brochures/Pamphlets</p>	<p>Get the word out to the residential population to be mindful of what is dumped on the ground and down catch basins. Dispose of dog waste properly. Have links to Storm Water videos available on Town Website.</p>	<p>Residents</p>	<p>DPW/DCR</p>	<p>Count the number of waste fliers distributed with dog licenses. Count the website hits to links to videos about storm water contamination. Note the number of notices sent out annually with quarterly Town Newsletter. Count the website hits to links to videos about storm water contamination.</p>	<p>2021</p>

<p>Brochures/Pamphlets</p>	<p>Get the word out to the commercial population to be mindful of what is dumped down sinks, toilets and down catch basins. Be mindful of grease traps. Have links to Storm Water videos available on Town Website.</p>	<p>Businesses, Institutions and Commercial Facilities</p>	<p>Health Department</p>	<p>Count the number of notices sent out annually. Count the website hits to links to videos about storm water contamination.</p>	<p>2021</p>
<p>Meeting</p>	<p>Explain to developers of our storm water bylaws. Enforce these bylaws during and after construction. Have links to Storm Water videos available on Town Website.</p>	<p>Developers (construction)</p>	<p>Conservation Committee</p>	<p>To control all runoff from developments and construction sites during and after construction. Count the website hits to links to videos about storm water contamination.</p>	<p>2021</p>
<p>Brochures/Pamphlets</p>	<p>Get the word out to the industrial population to be mindful of what is dumped down sinks, toilets and down catch basins. Be mindful of process water and where it is discharged if applicable. Have links to Storm Water videos available on Town Website. Put videos on local access channel.</p>	<p>Industrial Facilities</p>	<p>Health Department</p>	<p>Make sure all of our Industrial facilities receive annual notices about what is discharged down sink, toilets, catch basins and what is done with any process water. Count the website hits to links to videos about storm water contamination.</p>	<p>2021</p>









## 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	Develop SSO inventory in accordance of permit conditions	Weston & Sampson	Complete within 1 year of effective date of permit	2019
Storm sewer system map	Create map and update during IDDE program completion	External Contractor/DCR	Update map within 2 years of effective date of permit and complete full system map 10 years after effective date of permit	2020
Written IDDE program	Create written IDDE program	Planning Board/DPW	Complete within 1 year of the effective date of permit and update as required	2018
Implement IDDE program	Implement catchment investigations according to program and permit conditions	Planning/DPW/ Conservation	Complete 10 years after effective date of permit	2019
Employee training	Train employees on IDDE implementation	Building/Health/Conservation/DPW	Train annually	2019
Conduct dry weather screening	Conduct in accordance with outfall screening procedure and permit conditions	DCR/DPW	Complete 3 years after effective date of permit	2022
Conduct wet weather screening	Conduct in accordance with outfall screening procedure	DCR/DPW	Complete 10 years after effective date of permit	2022
Ongoing screening	Conduct dry weather and wet weather screening (as necessary)	DCR/DPW	Complete ongoing outfall screening upon completion of IDDE program	2019



## 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	Complete written procedures of site inspections and enforcement procedures	Planning/Building/Conservation/DCR	Complete within 1 year of the effective date of permit	2018
Site plan review	Complete written procedures of site plan review and begin implementation	Planning/Conservation	Complete within 1 year of the effective date of permit	2018
Erosion and Sediment Control	Adoption of requirements for construction operators to implement a sediment and erosion control program	Planning/Conservation	Complete within 1 year of the effective date of permit	2018
Waste Control	Adoption of requirements to control wastes, including but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes	Planning/Building/DPW/Conservation	Complete within 1 year of the effective date of permit	2018



### 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	The procedures to require submission of as-built drawings and ensure long term operation and maintenance will be a part of the SWMP	Planning/Building/Conservation	Require submission of as-built plans for completed projects	2018
Target properties to reduce impervious areas	Identify at least 5 permittee-owned properties that could be modified or retrofitted with BMPs to reduce impervious areas and update annually	Planning/Building/Conservation/DPW	Complete 4 years after effective date of permit and report annually on retrofitted properties	2021
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. We are a Green Community	Planning/Conservation/DPW	Complete 4 years after effective date of permit and implement recommendations of report	2021
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.	Planning/Building	Complete 4 years after effective date of permit and implement recommendations of report	2021



## 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> <small>(enter your own text to override the drop down menu or entered text)</small>	<b>BMP Description</b>	<b>Responsible Department/Parties</b> <small>(enter your own text to override the drop down menu)</small>	<b>Measurable Goal</b> <small>(all text can be overwritten)</small>	<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	Planning/Conservation/DPW	Complete and implement 2 years after effective date of permit	2020
Inventory all permittee-owned parks and open spaces, buildings and facilities, and vehicles and equipment	Create inventory	DPW	Complete 2 years after effective date of permit and implement annually	2020
Infrastructure O&M	Establish and implement program for repair and rehabilitation of MS4 infrastructure	DPW	Complete 2 years after effective date of permit	2020
Stormwater Pollution Prevention Plan (SWPPP)	Create SWPPPs for maintenance garages, transfer stations, and other waste-handling facilities	Conservation/DPW	Complete and implement 2 years after effective date of permit	2020
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 moved annually	2019
Street sweeping program	Sweep all streets and permittee-owned parking lots in accordance with permit conditions	DPW Operations	Sweep all streets and permittee-owned parking lots once per year in the spring	2018
Road salt use optimization program	Establish and implement a program to minimize the use of road salt	DPW Construction	Implement salt use optimization during deicing season	2018









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.

Click to add text

# 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:

Title:

Signature:

Date:

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

VIA EMAIL

March 5, 2019

Christopher A. Rucho  
Chairman, Board of Selectmen

And;

Vernon L. Jackson, Jr.  
35 Worcester St.  
West Boylston, MA. 01583  
vjackson@westboylston-ma.gov

Re: National Pollutant Discharge Elimination System Permit ID #: MAR041171, Town of West Boylston

Dear Vernon L. Jackson, Jr.:

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

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

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

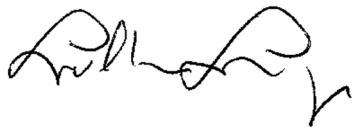
Information about the permit and available resources can be found on our website: <https://www.epa.gov/npdes-permits/massachusetts-small-ms4-general-permit>. Should you have any questions regarding this permit please contact Newton Tedder at [tedder.newton@epa.gov](mailto:tedder.newton@epa.gov) or (617)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

Sincerely,

A handwritten signature in blue ink that reads "Thelma Murphy". The signature is fluid and cursive, with a long horizontal flourish extending to the right.

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

and;

A handwritten signature in black ink that reads "Lealdon Langley". The signature is cursive and somewhat stylized, with a prominent loop at the end.

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



# 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:

August 14, 2018

Consultation Code: 05E1NE00-2018-SLI-2740

Event Code: 05E1NE00-2018-E-06404

Project Name: West Boylston MA

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-2740

Event Code: 05E1NE00-2018-E-06404

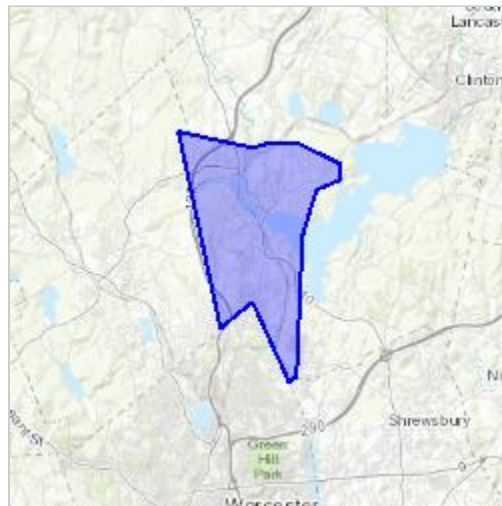
Project Name: West Boylston MA

Project Type: \*\* OTHER \*\*

Project Description: MS4 Compliance

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/42.357892336022815N71.78595769810786W>



Counties: Worcester, MA

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## Endangered Species Act Species

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

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

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries<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

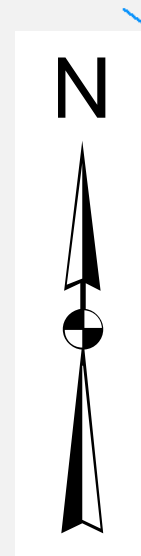
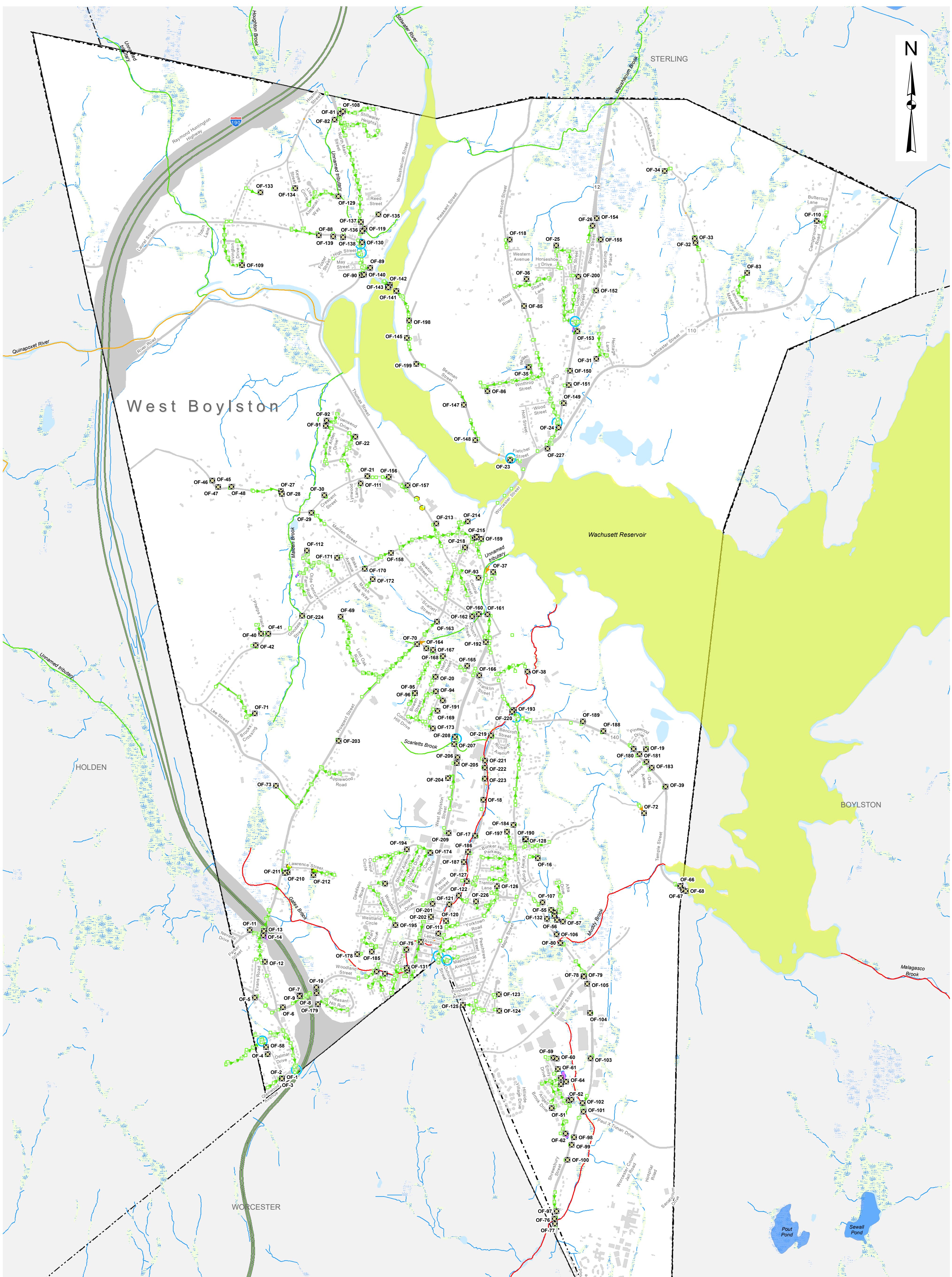
## Critical habitats

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

---

## APPENDIX E

### Drainage System and Receiving Waters Map



Legend			
	Outfalls		2 - Attaining some uses; other uses not assessed
	Storm Manholes		3 - No uses assessed
	Catch Basins		4A - Impaired - TMDL is completed
	Interconnections		4C - Impairment not caused by a pollutant
	Storm Gravity Mains		5 - Impaired - TMDL required
	Storm Culverts		2 - Attaining some uses; other uses not assessed
	Storm Network Structures		3 - No uses assessed
			4A - Impaired - TMDL is completed
			4C - Impairment not caused by a pollutant
			5 - Impaired - TMDL required
	Building		Hydrologic Connection
	Marsh/Bog		Wooded marsh
	Cranberry Bog		Open Water
	Salt Marsh		Tidal Flats
	Open Water		Beach/Dune
	Tidal Flats		Storm Detention Areas
	Beach/Dune		
	Storm Detention Areas		

**FIGURE 1**  
**TOWN OF WEST BOYLSTON, MASSACHUSETTS**  
**STORMWATER GIS**

**DRAINAGE SYSTEM AND RECEIVING WATERS**

JUNE 2022 SCALE: NOTED

## APPENDIX F

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/WestBoylstonma05rpt.pdf>

Year 3 Annual Report (2005-2006)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2006/Westboylston06rpt.pdf>

Year 4 Annual Report (2006-2007)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2007/Westboylston07.pdf>

Year 5 Annual Report (2007-2008)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2008/WestBoylston08.pdf>

Year 7 Annual Report (2009-2010)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2010/WestBoylston10.pdf>

Year 8 Annual Report (2010-2011)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2011/WBoylston11.pdf>

Year 9 Annual Report (2011-2012)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2012/WestBoylston12.pdf>

Year 10 Annual Report (2012-2013)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2013/WestBoylston13.pdf>

Year 11 Annual Report (2013-2014)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2014/WestBoylston14.pdf>

Year 12 Annual Report (2014-2015)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2015/WestBoylston15.pdf>

Year 14 Annual Report (2016-2017)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2017/WestBoylston17.pdf>

Year 15 Annual Report (2017-2018)

<https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/ma/reports/2018/WestBoylston18.pdf>



## APPENDIX G

### MS4 Checklists by Permit Year

Checklist for Year 1 MS4 Permit Requirements – West Boylston, 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	Completed in Permit Year 4
6/30/2019	Bacteria Impaired Water Bodies	Implement public education initiatives; Rank catchments tributary to bacteria/pathogen impaired waters as Problem or High in catchment ranking	H.III.2.a.i; H.III.2.a.ii	Completed in Permit Year 4
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	No
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	No
6/30/2019	Sanitary Sewer Overflow (SSO) Inventory	Document all SSOs that have occurred in the last 5 years	2.3.4.4.b	Yes
6/30/2019	Illicit Discharge Detection and Elimination (IDDE) Plan	Develop written IDDE plan to satisfy permit requirements.	2.3.4.6	Completed in Permit Year 4
6/30/2019	Catchment Delineation	Delineate outfall & interconnection catchment areas.	2.3.4.5	Completed in Permit Year 4
6/30/2019	Catchment Prioritization & Ranking	Assess and rank the potential for all catchments to have illicit discharges.	2.3.4.7	Completed in Permit Year 4
6/30/2019	IDDE Employee Training	Continue to train municipal employees on illicit discharge detection and monitoring.	2.3.4.11	Completed in Permit Year 4
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	2.3.5.c	Completed in Permit Year 4

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
		Sediment & Erosion Control BMPs.		
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 catch basins cleaned and volume of material removed annually.	2.3.7.a.iii.3	Yes
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	Completed in Permit Year 4
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	Completed in Permit Year 4

Checklist for Year 2 MS4 Permit Requirements – West Boylston, MA

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
6/30/2020	Stormwater Management Plan (SWMP)	Update written SWMP	1.10	Completed in Permit Year 4
6/30/2020	Bacteria Impaired Water Bodies	Implement public education initiatives	H.III.2.a.i	Completed in Permit Year 4
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	No
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	Completed in Permit Year 4
6/30/2020	IDDE Employee Training	Continue to train municipal employees on illicit discharge detection and monitoring.	2.3.4.11	Completed in Permit Year 4
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 retention and treatment requirements, to meet as-built requirements and provide for long term operation & maintenance of BMPs.	2.3.6.a.ii	No
6/30/2020	Inventory of Municipal Facilities	Develop an inventory of all permittee-owned facilities.	2.3.7.a.ii	Completed in Permit Year 4
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	Completed in Permit Year 4

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
6/30/2020	Stormwater Pollution Prevention Plans (SWPPP)	Develop written SWPPPs for municipal waste handling facilities.	2.3.7.b	Completed in Permit Year 4
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	No
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	Inspections Completed in Permit Year 4

Checklist for Year 3 MS4 Permit Requirements – West Boylston, MA

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
6/30/2021	Stormwater Management Plan (SWMP)	Update written SWMP	1.10	Completed in Permit Year 4
6/30/2021	Bacteria Impaired Water Bodies	Implement public education initiatives	H.III.2.a.i	Yes
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	Yes
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	No
6/30/2021	Update Drainage Map	Update town-wide drainage mapping as needed to include MS4 infrastructure.	2.3.4.5	No
6/30/2021	IDDE Employee Training	Continue to train municipal employees on illicit discharge detection and monitoring.	2.3.4.11	No
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	Completed in Permit Year 4
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	Completed in Permit Year 4
6/30/2025	Continue IDDE Investigation of Problem Catchments	Continue investigation of problem catchments	2.3.4.8.a	N/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	No
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	Yes

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
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	No
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	Inspections Completed in Permit Year 4

Checklist for Year 4 MS4 Permit Requirements – West Boylston, MA

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
6/30/2022	Stormwater Management Plan (SWMP)	Update written SWMP	1.10	Yes
6/30/2022	Bacteria Impaired Water Bodies	Implement public education initiatives	H.III.2.a.i	Yes
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	Yes
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	Yes
6/30/2022	Update Drainage Map	Update town-wide drainage mapping as needed to include MS4 infrastructure.	2.3.4.5	Yes
6/30/2022	IDDE Employee Training	Continue to train municipal employees on illicit discharge detection and monitoring.	2.3.4.11	Yes
6/30/2025	Continue IDDE Investigation of Problem Catchments	Continue investigation of problem catchments	2.3.4.8.a	N/A – No Problem Catchments
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	No
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	No
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	Yes
6/30/2022	Green Infrastructure Practices	Develop a report assessing the barriers and incentives for Green Infrastructure/LID techniques.	2.3.6.c	Yes



Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
6/30/2022	BMP Retrofit Identification	Identify 5 permittee-owned properties that could be retrofitted with stormwater BMPs.	2.3.6.d	Yes
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	Yes
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	Yes – Started to Collect Data Needed for CB Cleaning Optimization Plan
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	Inspections Completed in Permit Year 4

Checklist for Year 5 MS4 Permit Requirements – West Boylston, MA

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
6/30/2023	Stormwater Management Plan (SWMP)	Update written SWMP	1.10	Yes
6/30/2023	Bacteria Impaired Water Bodies	Implement public education initiatives	H.III.2.a.i	Yes
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	Yes
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	Yes
6/30/2023	Update Drainage Map	Update town-wide drainage mapping as needed to include MS4 infrastructure.	2.3.4.5	Yes
6/30/2023	IDDE Employee Training	Continue to train municipal employees on illicit discharge detection and monitoring.	2.3.4.11	Yes
6/30/2025	Continue IDDE Investigation of Problem Catchments	Continue investigation of problem catchments	2.3.4.8.a	N/A – No Problem Catchments
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	Yes
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	Yes
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	Yes
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	Yes – Continued to Collect Data Needed for CB Cleaning

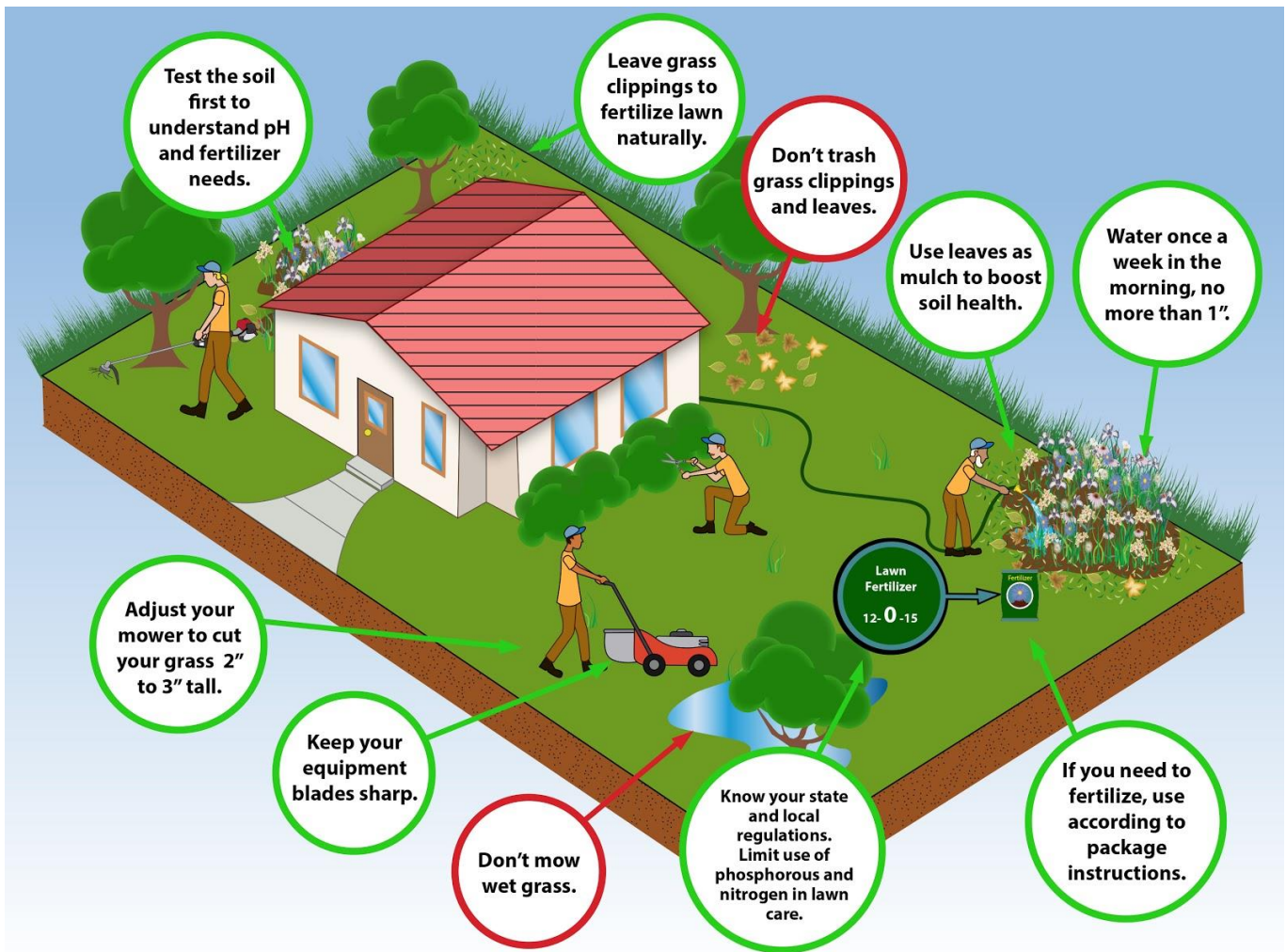
Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
				Optimization Plan
6/30/2023	Stormwater BMP Inspection & Maintenance	Inspect all stormwater treatment structures (BMPs) at least annually and conduct maintenance as necessary. Track number of structures maintained and inspected annually.	2.3.7.a.iii.6	Yes

## APPENDIX H

### Public Education Materials



## Lawn and Garden Tips to Help Curb Stormwater Pollution



Under Massachusetts law, only apply fertilizer with phosphorus if:

1. A soil test shows that phosphorus is needed; or
2. During the first growing season for a newly established lawn.

Contact the UMass Cooperative Extension Soil Nutrient Testing Laboratory to learn how to conduct a routine soil test: <https://ag.umass.edu/services/soil-plant-nutrient-testing-laboratory/ordering-information-forms>

Business owners can do their part to keep Massachusetts' waterways clean.

Find more tips like these at [www.ThinkBlueMassachusetts.org](http://www.ThinkBlueMassachusetts.org).



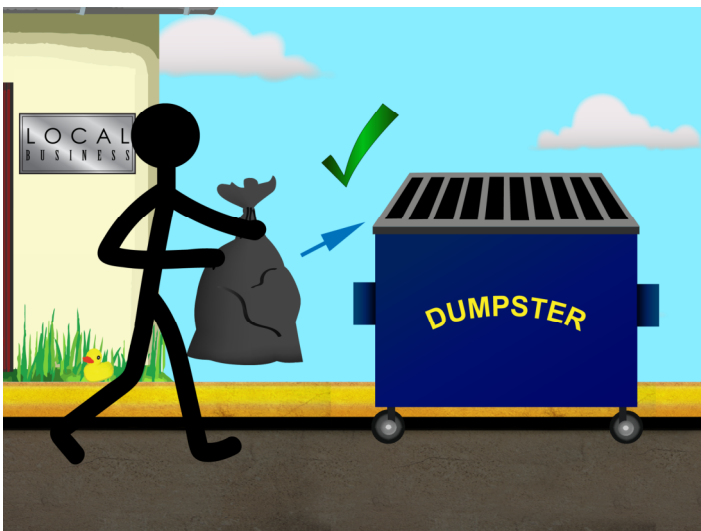


## Put Waste in its Place for Clean Water in West Boylston



As a business owner, you are responsible for all pollutants that leave your property. You play a big role in keeping our waterways clean and healthy! Do your part by keeping your property clean and properly storing your trash until pick-up.

### DO



- Inspect your dumpster daily.
- Make sure the lid is kept closed and locked.
- Check for leaks and replace, if needed.
- Schedule regular trash pick-ups to prevent the dumpster from becoming too full.

### DON'T



- Don't place leaking containers in the dumpster when emptying trash.
- Though it's sure to get smelly, never hose down the inside of your dumpster.

### Why is this necessary?

Rain that falls into and around your dumpsters can pick up trash and dirt as it drains away. Much of this water, or stormwater, ends up in our lakes, rivers, and streams. It's the fastest growing type of water pollution in Massachusetts. Stormwater pollution is bad business for our state's waterways. It harms fish and wildlife, makes our water unsafe to drink, and can spoil outdoor activities.

# Salt and Sand Usage

## Winter Stormwater Stewardship

Salt and sand used to deice driveways and sidewalks keeps us from falling. But stormwater runoff flowing down streets and over land can collect winter sand, road salt, and more. What goes into our storm drains goes directly into waterbodies and carries whatever pollutants it may pick up along the way. Too much salt or sand can pollute our waterways.



## Things You Can Do to Protect Water Quality and Prevent Pollution

- Salt **before** the storm to prevent ice.
- Remove snow manually before applying any salt or sand sparingly.
- Clean up any **extra** or spilled salt and sand.
- Store salt and de-icing chemicals **carefully**, away from drinking water supplies.
- Do not dispose of snow in waterbodies.
- Select **nontoxic** de-icing products.

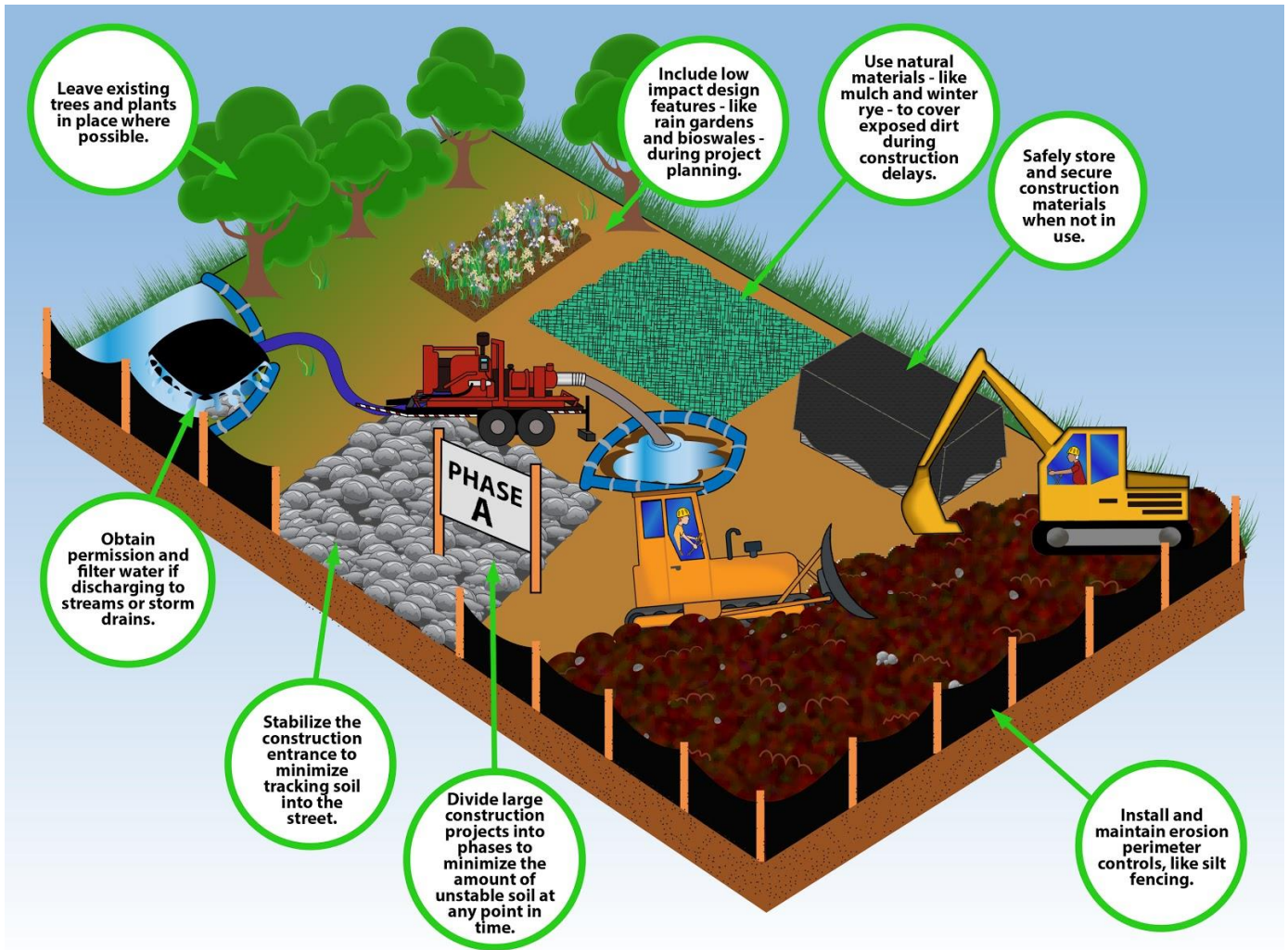
For more information, call the Town of West Boylston DPW at 508-835-4820





**THINK BLUE**  
MASSACHUSETTS

## Plan Ahead to Prevent Pollution: Tips to Reduce Stormwater Runoff During Construction



Contact EPA and your municipality to make sure you have the proper permits before beginning construction.

Construction companies can do their part to keep Massachusetts' waterways clean.

Find more tips like these at [www.ThinkBlueMassachusetts.org](http://www.ThinkBlueMassachusetts.org).



**THINK BLUE**  
MASSACHUSETTS



# Stormwater Pollution Prevention Guide

## FOR INDUSTRY

Protect your business, your clients and your reputation by installing and maintaining industrial stormwater best management practices (BMPs) properly.

You'll not only avoid fines and work stoppages, you'll be protecting the waterways your community depends on, and earning a well deserved reputation.



For more information visit:  
[www.nepwater.org](http://www.nepwater.org)

# Stormwater and Industry

## General Cleaning



- Whenever possible, purchase water based cleaning products. Look for products labeled “non-toxic,” “non-petroleum based,” “ammonia-free,” “phosphate-free,” and/or “readily biodegradable”.
- Dispose of unused portions properly, and follow appropriate cleanup practices.
- Collect wastes for recycling or proper disposal.
- Read labels carefully and follow directions.
- Use a mop and bucket, and dispose of wash water down a mop sink, floor drain, or sanitary sewer (sink or toilet). Never pour wash water or chemicals down a stormdrain.
- Be sure to store all chemicals in appropriate containers that don't leak.
- Sweep shop floors, materials processing and storage areas, access roads, parking lots and sidewalks. Do not wash down with a hose.
- Collect and dispose of debris in waste containers. Do not sweep into the gutter or stormdrain.

## Spills



- Keep a spill kit appropriate for the materials you use handy and stocked, ready for use.
- Clean up spills immediately to minimize safety hazards and prevent spills from entering storm drains and discharge points.
- Use absorbent material or containment berms for liquid spills, rather than hosing down the area. Remove the absorbent materials promptly and dispose of properly.
- Always use dry methods to clean spills (sweeping) and never hose down the area. Any excess chemical spills, especially outdoors, should be swept up immediately.
- Report any chemical spill to the local hazardous waste cleanup team. They'll know the best way to keep spills from harming the environment.

## Dumpsters



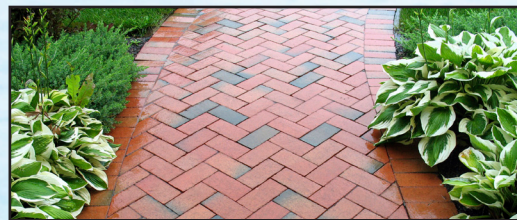
- Prevent polluted runoff by covering all dumpsters. Anything in an uncovered dumpster or trash bin is vulnerable to the weather, and can wash into nearby stormdrains during wet weather.
- Schedule regular waste pick-ups.
- Never wash down dumpsters with a hose. If cleaning is needed, contact the leasing company.
- Check dumpsters regularly for leaks, and replace if necessary.

## Parking Lots



- Control litter by sweeping and picking up trash regularly.
- Dry sweep paved areas on a regular basis, especially around storm drains. This includes parking lots, patios, sidewalks & dumpster areas.
- Do NOT use a hose to wash down pavement.

## Landscaping



- Use organic fertilizer whenever possible. Organic or slow-release nitrogen fertilizer causes less harm to water. Be sure to use fertilizer with no or low phosphorus—phosphorus causes algae growth in water.
- Limit the use of lawn chemicals and always follow directions. Use the smallest amount necessary.
- If you are having problems with your grass, don't keep adding chemicals. Have your soil tested at the UMass Extension: <http://extension.umass.edu/landscape/>
- Use permeable materials, like pavers or crushed stone for any “hardscape” projects, such as patios or walkways. Permeable systems allow rain and snow melt to soak through the material, thereby decreasing stormwater runoff.

## Irrigation



- Avoid over-watering to prevent excess runoff.
- Avoid irrigating when it's windy to prevent runoff and evaporation.
- Make sure that sprinkler heads are pointed at the lawn and not the pavement – adjust and fix heads as necessary.
- Upgrade to a moisture sensor to ensure irrigating only when needed, and avoid using old-fashioned irrigation timers.

## Snow/Ice Removal



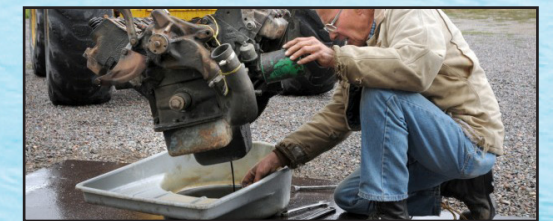
- Avoid over-salting in the winter, and sweep up any excess or spills.
- Store salt in a covered area.
- Use a product that is non-toxic to vegetation and wildlife.
- Do not dump snow into a body of water.

## Material Storage



- Store all outdoor containers holding powder and liquid materials under cover to protect from rain and snow, and keep in good condition.
- Use secondary containment devices or construct dikes/curbs to contain any possible leaks.
- Keep all containers closed and secure.
- Store soil and mulch piles in contained areas where they cannot be washed into the storm drainage system. When these materials are transported for use on site, store them on the lot and out of the street where they won't be washed into the street and storm drain system with overspray from irrigation or stormwater.

## Equipment Maintenance

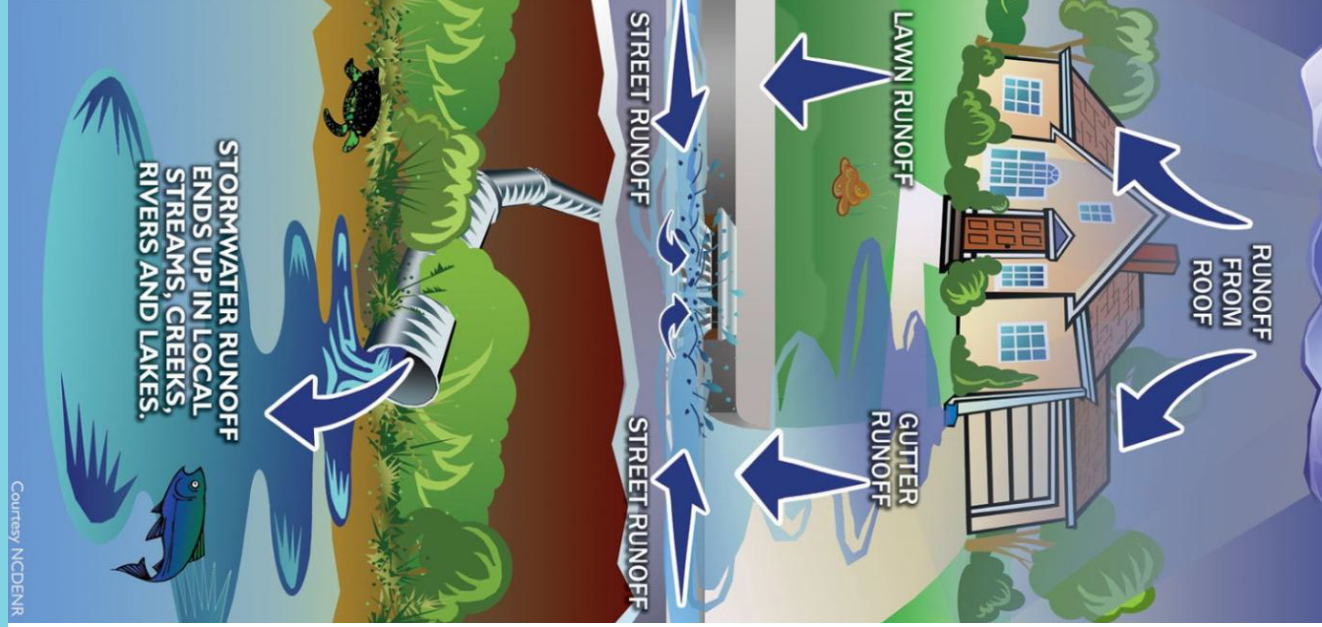


- Inspect vehicles and equipment for leaks regularly. Fix problems as soon as possible.
- When draining fluids, use a drip pan and/or funnel to prevent any spills.
- Keep a cleanup kit of safety equipment and absorbent material, such as kitty litter or sand for spills.
- Never hose down streets or sidewalks to clean. Use a broom and properly dispose of sweepings.

# Maintain your BMPs!

[www.nepwater.org](http://www.nepwater.org)

Courtesy NCDENR



## Industrial

*The federal EPA will soon be imposing requirements on municipal stormwater systems, which may be very costly for towns to implement.*

Minimizing the pollutants that run off of your site and into stormdrains may reduce the need for towns to raise revenue to comply with these new federal rules.

Taking low cost actions now may result in significant future savings for you in the future.

Stormwater runoff from industrial activities is regulated because it can have a significant impact on water quality by contributing sediment and other pollutants to creeks, streams, lakes, etc.

Follow Best Management Practices (BMP's) to reduce or eliminate industrial stormwater runoff pertaining to:

- general cleaning, both indoors and outdoors;
- maintenance and cleaning of dumpsters and disposal areas;
- materials storage;
- spills;
- usage of cleaners and solvents;
- equipment maintenance;
- landscaping and irrigation;
- snow and ice removal.

In addition to statewide rules, you may be required to meet additional local stormwater control regulations.

**Check with your city or county government to determine if additional local rules apply to your workplace.**



Many folks don't make the connection that storm drains and waterways are connected. Every time something gets washed down a stormdrain, it can affect the cleanliness and health of the water that we rely on for drinking and recreation.

**Common stormwater pollutants include:**  
 Antifreeze, Detergents, Fertilizers, Gasoline, Household Chemicals, Motor Oil, Paints, Pesticides, Pet Waste, Road Salt, Solvents, Yard Waste



You can help to protect local waterways from contaminants by eliminating practices that contribute to stormwater pollution. Picking up after pets and disposing of waste in a trash can is a great start!

Preventing storm water pollution helps to keep our waterways clean for future generations. **Consider your actions and do your part for clean water.**



Learn more about preventing stormwater pollution: [www.nepwater.org](http://www.nepwater.org)

Place Stamp Here

**Stormwater pollution** is a toxic mix of bacteria, chemicals, metals, nutrients and other contaminants that wash off of impervious surfaces, down stormdrains, and into local waterways.



# Stormwater Pollution Prevention Guide

## Industrial



## Know the Drill for Spills: Spill Prevention for Industrial Facilities

As an industry owner, you are responsible for all pollutants that leave your property. You play a big role in keeping our waterways clean and healthy! Follow these tips to prevent spills at your facility and reduce polluted runoff.

### DO



- Inspect facilities yearly and perform maintenance activities as needed.
- Ensure floor drains and other drains are properly connected to sanitary sewer systems.
- Keep up-to-date maintenance and inspection records on-site.
- Keep your Spill Prevention Control and Countermeasure Plan (SPCC) in an easy-to-find location. Know how to implement it in case of a spill. Review procedures periodically and update every 5 years.
- Train employees to respond to spills.
- Keep spill response kits in accessible locations throughout the facility, especially near areas where spills may occur.
- Consider purchasing drain cover seals to isolate areas to prevent spilled materials from entering the drainage system and local waterways.

### DON'T



- Don't leave chemicals and hazardous materials in open or loosely sealed containers. Store them in closed and labeled containers.
- Don't store chemicals and hazardous materials outside. Containers should be kept inside secure buildings and on impervious surfaces.
- Don't forget to wear appropriate protective equipment, such as gloves, goggles, and hazmat boots, when cleaning up a spill.
- Don't allow spills to enter storm drain systems. Report & monitor any spills to storm sewer or waterways to appropriate state and local authorities.

### Why is this necessary?

Rain that falls on and around your site can pick up trash, dirt, and chemical residue as it drains away. Much of this water, or stormwater, ends up in our lakes, rivers, and streams. It's the fastest growing type of water pollution in Massachusetts. Stormwater pollution is bad business for our State's waterways. It harms fish and wildlife, makes our water unsafe to drink, and can spoil outdoor activities.

### For More Information:

EPA NPDES Permit Requirements: <https://www.epa.gov/npdes/final-2015-msgp-documents>

Industrial facilities can do their part to keep Massachusetts' waterways clean.

Find more tips like these at [www.ThinkBlueMassachusetts.org](http://www.ThinkBlueMassachusetts.org).





## Slow the Flow with Low Impact Development Practices

As a business owner, you play an important role in keeping our waterways clean and healthy! One way you can help is by installing Low Impact Development practices that collect, slow down, spread out, and filter stormwater into the soil.

### Practice

### In Dry Weather

### In Wet Weather

#### Porous Pavers

Permeable pavers and crushed stone can be used in place of traditional asphalt and concrete to pave surfaces. Porous pavers allow water to slowly drain through the paved areas.



#### Absorbent Asphalt

These materials allow rain and melting snow to soak into the ground instead of flowing into storm drains.



#### Parking Lot Swales

Bioswales are vegetated channels that slow, treat, and filter runoff as it flows from one place to another. These features are ideal to place along streets and parking lots.



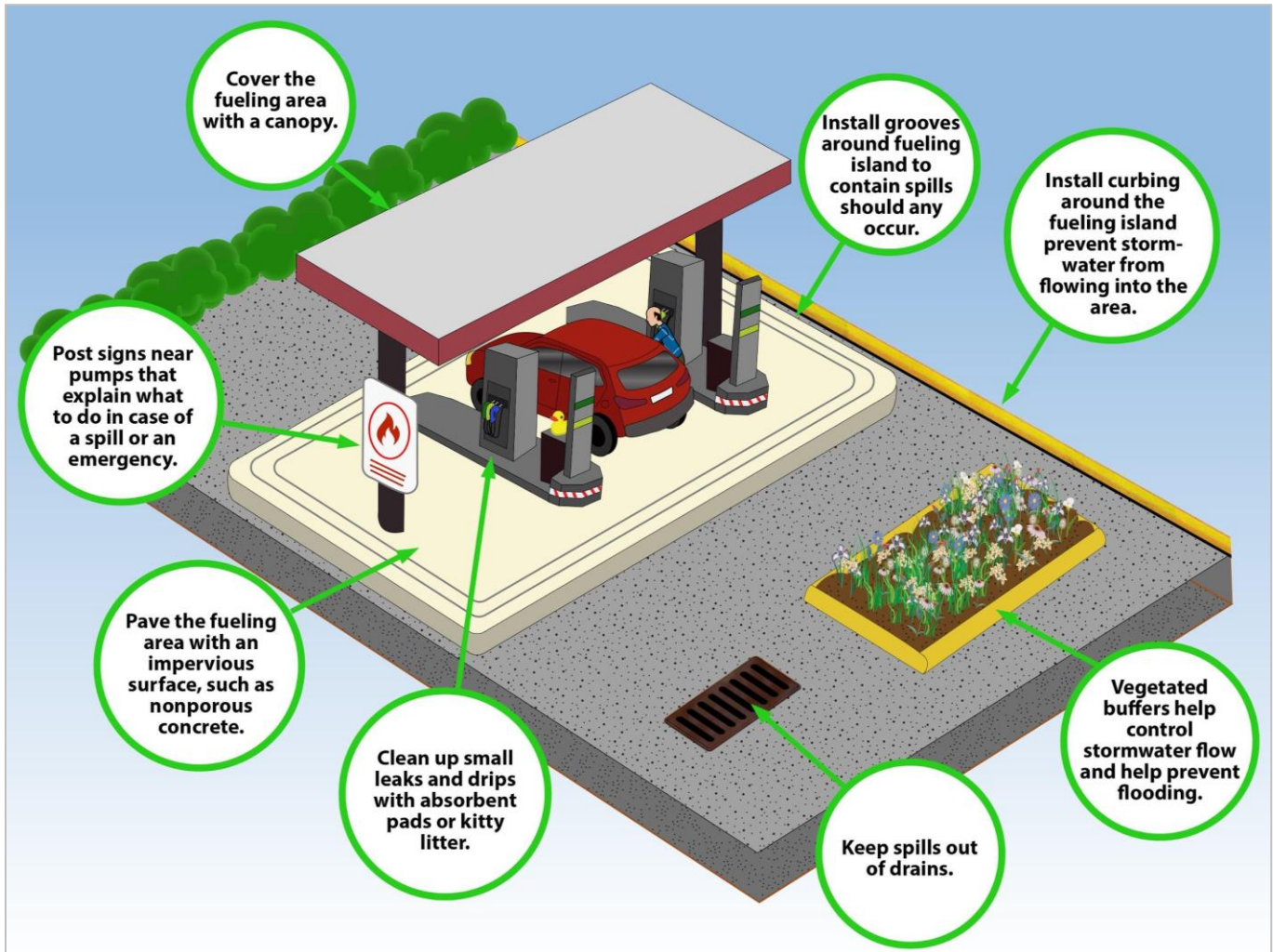
Business owners can do their part to keep Massachusetts' waterways clean.

Find more tips like these at [www.ThinkBlueMassachusetts.org](http://www.ThinkBlueMassachusetts.org).





## Put a Brake on Stormwater Runoff from Gas Stations



*Maintenance is important for the optimal performance of all these practices.*

Business owners can do their part to keep Massachusetts' waterways clean.

Find more tips like these at [www.ThinkBlueMassachusetts.org](http://www.ThinkBlueMassachusetts.org).





Board of Selectmen  
Christopher A. Rucho, Chairman

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**Town Meeting**  
May 20- Monday  
7:00 pm  
Middle/High School

**Warrant Available**  
[www.westboylston-ma.gov](http://www.westboylston-ma.gov)

**Refer Questions To**  
Interim Town Administrator  
Nancy Lucier

(774) 261-4012  
[nlucier@westboylston-ma.gov](mailto:nlucier@westboylston-ma.gov)

**WBPA-Public Access TV Channels:**  
191 – Public  
192 – Education  
194 - Government

Dear Resident:

Town Meeting is an opportunity for registered voters to participate in West Boylston governance by voting on annual budgets and operating expenses, town by-laws and special issues raised by the Board of Selectmen or Town Residents.

The first Semi-Annual Town Meeting of 2019 is scheduled for **Monday, May 20, 2019** at 7:00 pm. Middle/High School Auditorium, 125 Crescent Street.

Your Board of Selectmen looks forward to seeing you and your fellow citizens at the **May 20<sup>th</sup>** Semi-Annual Town Meeting.

Sincerely,  
Christopher A. Rucho, Chairman

**TOWN NEWS ON OTHER SIDE**

*"Small Town, Big Heart"*

Town of West Boylston



Board of Selectmen  
Christopher A. Rucho, Chairman

**TRASH/RECYCLE – NEEDS TO BE OUT AT THE CURB AT 7:00 A.M.  
REGARDLESS OF WHAT TIME IT IS COLLECTED ON YOUR STREET**

## **THE SENIOR CENTER IS NOW LOCATED AT 120 PRESCOTT STREET**

**Beaman Memorial Public Library Summer Hours June-August  
Tuesday 10-8, Wednesday 10-8, Thursday 10-8, Friday 10-5, Saturday 9-12  
Summer Saturday hours are a gift from the College of the Holy Cross**

**If you are on town sewer, please do not flush anything except toilet paper. Many other materials are being introduced into the system that are disruptive and destructive to the pump stations pumps- including wet wipes that do not shred easily and become entangled in the pumps. Medical items are also showing up at the pump stations and have to be removed manually.**

### **REMINDER – WE HAVE A TOWN BYLAW ON REMOVAL OF DOG LITTER & A LEASH LAW**

If any dog shall defecate upon any public property or area, then the owner, keeper or person then walking or otherwise in charge of said dog shall immediately remove or cause to be removed from said property or area, all feces so deposited by said dog. Such owner, keeper or person when walking or otherwise in charge of a dog on public property or a private area must have in his or her immediate possession an appropriate device for scooping excrement. Whoever owns or keeps a dog within the Town shall confine said dog to the owner's or keeper's premises at all times and shall keep said dog on a leash while on a public way. This section shall not apply to dogs being used for hunting or training purposes. Whoever violates Section 3(a) of this article shall be punished by a fine in accordance with the laws of the Commonwealth of Massachusetts

**DO NOT DEPOSIT DOG WASTE BAGS IN CATCH BASINS. IT CAUSES CONTAMINATION DOWNSTREAM  
IF YOU SEE THIS HAPPENING REPORT IT VIA OUR WEBSITE OR CALL THE DPW 508.835.4820**



Selectboard  
John W. Hadley, Chairman

**Town Meeting  
May 17- Monday**

**6:00 pm  
Middle/High School ball  
field**

**Rain Date**

**May 24 – Monday**

**6:00 p.m.**

**Middle/High School ball  
field**

**Warrant Available**

[www.westboylston-ma.gov](http://www.westboylston-ma.gov)

**Refer Questions To**

Town Administrator

Nancy Lucier

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Dear Resident:

The first Semi-Annual Town Meeting of 2021 is scheduled for **Monday, May 17, 2021** at 6:00 pm. Middle/High School Ballfield, 125 Crescent Street.

Town Meeting is an opportunity for registered voters to participate in West Boylston governance by voting on annual budgets and operating expenses, town by-laws and special issues raised by the Selectboard or Town Residents.

We have a safe distancing plan and request all attendees abide by the following guidelines. If you are feeling sick, are exhibiting a fever, cough, shortness of breath, chills, muscle pain, headache, sore throat or new loss of taste or smell, or have potentially been exposed to someone with confirmed or suspected COVID-19, you should not attend town meeting.

Town Meeting will take place outside on the baseball field next to the Middle/High School gymnasium. Chairs will be set up 6-feet apart. We encourage all attendees at town meeting to remain 6 feet apart, unless you are members of the same immediate household, or wear a face covering or mask in accordance with COVID-19 Order No. 31. **To minimize any opportunities for exposure at the sign in tables, please wear your mask until you get to your seat, where warrants and handouts will be enclosed in zip lock bags and placed on the chairs set up in the field. Hand sanitizer will be available on a table next to the two entrance gates to the ball field. We encourage attendees to apply insect repellent and bring a water bottle.** The school will be open should anyone need to use their facilities. Anyone who may need assistance from the parking lot to the field, please contact my office at 774.261.4012 and we will arrange for assistance.

The first Semi-Annual Town Meeting of 2021 is scheduled for **Monday, May 17, 2021 at 6:00 pm.** outside on the ball field of the Middle/High School , 125 Crescent Street. Your Selectboard looks forward to seeing you on **May 17<sup>th</sup>.**

Sincerely,

John W. Hadley, Chairman

**TOWN NEWS ON OTHER SIDE**





Selectboard  
John W. Hadley, Chairman

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**TRASH/RECYCLE & PINK BAGS – NEED TO BE OUT AT THE CURB AT 7:00 A.M.  
REGARDLESS OF WHAT TIME IT IS COLLECTED ON YOUR STREET**

**If you are on town sewer, please do not flush anything except toilet paper. Many other materials are being introduced into the system that are disruptive and destructive to the pump station pumps - including wet wipes that do not shred easily and become entangled in the pumps. Medical items are also showing up at the pump stations and have to be removed manually.**

**REMINDER – WE HAVE A TOWN BYLAW ON REMOVAL OF DOG LITTER & A LEASH LAW**

If any dog shall defecate upon any public property or area, then the owner, keeper or person then walking or otherwise in charge of said dog shall immediately remove or cause to be removed from said property or area, all feces so deposited by said dog. Such owner, keeper or person when walking or otherwise in charge of a dog on public property or a private area must have in his or her immediate possession an appropriate device for scooping excrement. Whoever owns or keeps a dog within the Town shall confine said dog to the owner's or keeper's premises at all times and shall keep said dog on a leash while on a public way. This section shall not apply to dogs being used for hunting or training purposes. Whoever violates Section 3(a) of this article shall be punished by a fine in accordance with the laws of the Commonwealth of Massachusetts

**DO NOT DEPOSIT DOG WASTE BAGS IN CATCH BASINS. IT CAUSES CONTAMINATION DOWNSTREAM  
IF YOU SEE THIS HAPPENING REPORT IT VIA OUR WEBSITE OR CALL THE DPW 508.835.4820**

## APPENDIX I

### Regulatory Mechanisms

For the purpose of these bylaws an alarm system shall be defined as an assembly of equipment and devices to include a control panel arranged to signal the presence of an emergency situation requiring urgent attention by the Town, its employees or agents. The term alarm system shall not mean individual battery operated smoke or carbon monoxide detectors or household fire warning systems as required in 780 CMR The Massachusetts State Building Code, Section 3603.16.

#### SECTION 2- ACCESS FOR FIREFIGHTING KEYBOX

Where access to or within a structure or an area is unduly difficult because of secured openings or where immediate access is necessary for life-saving or fire-fighting purposes, as determined by the Fire Chief or his duly authorized agent, the Fire Chief may require a key box be installed in an accessible location. The key box shall be an approved type and shall contain keys to gain access as required by the Fire Chief.

For the purpose of this section a key box(s) shall not be required for private dwelling units or spaces.

#### SECTION 3- FALSE ALARMS

The alarm user of any fire alarm system shall be assessed a false alarm charge of \$300.00 for each false fire alarm transmitted by such system after three (3) false alarms in a consecutive twelve (12) month period where such false alarms result in a response by the Fire Department. This shall include false alarms that are transmitted as a result of failure of a responsible party on site to inform the Fire Department of ongoing work within the building, occupancy or space; maintenance, repair, of the alarm system itself which results in the false alarm; and/or lack of proper maintenance of the fire alarm system.

#### SECTION 4- EMERGENCY ADOPTION

The Fire Chief, with the approval of the Select Board members, may enact emergency regulations where deemed necessary for public safety, fire prevention or life safety. Prior to its enactment, an emergency regulation shall be posted in three (3) public places, require a public hearing, comply with the other requirements of Article XXIII of the General Bylaws, and be approved by the Select Board members.

Any emergency regulation enacted under the authority of this section shall be acted upon for ratification at the next scheduled Semi-Annual Town Meeting. A18 Oct 15, 2007

### ***ARTICLE XXXIII- Stormwater Bylaw***

#### 1.0- PURPOSE

A.) The purpose of this Bylaw is to protect the public health, safety, environment and general welfare by establishing requirements and procedures to manage stormwater runoff, promote groundwater recharge and to prevent water pollution from new development and redevelopment.

This Bylaw seeks to meet that purpose through the following objectives:

1. Establish regulations for land development activities that preserve the health of water resources;
2. Require that the quantity and quality of stormwater discharging from new development both during and after construction maintains or improves these characteristics compared to pre- development conditions in order to reduce flooding, stream erosion, pollution, property damage and harm to aquatic life;
3. Establish stormwater management standards and design criteria to control the quantity and quality of stormwater runoff;
4. Encourage the use of “low impact development practices”, such as reducing impervious cover and preserving greenspace and other natural areas;
5. Establish maintenance provisions to ensure that stormwater treatment practices will continue to function as designed and pose no threat to public safety;
6. Establish procedures for the Town’s review and enforcement of stormwater management plans and for the Town’s inspection of approved stormwater treatment practices.

B) Nothing in this Bylaw is intended to replace the existing regulations or bylaws of the Town of West Boylston. All activities are subject to all of the existing provisions of the Town of West Boylston and must comply with the specifications of each regulation or bylaw.

**2.0- DEFINITIONS**

Definitions are in Appendix A of this Bylaw and shall apply in the interpretation and implementation of the Bylaw. Terms not defined in this Appendix shall be understood according to their customary and usual meaning. Additional definitions may be adopted by separate regulation.

**3.0- ADMINISTRATION**

**A)** The Stormwater Authority shall be the West Boylston Director of Public Works. The Stormwater Authority shall administer, implement and enforce this Bylaw. All powers granted to or duties imposed upon the Stormwater Authority are extended to the Stormwater Authority’s designees. The Stormwater Authority’s designees for various projects that disturb more than 10,000 square feet are as follows:

Designee	Projects Distributing More 10,000 Square Feet
<b>Planning Board</b>	Subdivisions, Site Plans
<b>Zoning Board of Appeals</b>	Special Permits, Variances, 40B
<b>Earth Removal Board</b>	Earth Removal Permits
<b>Conservation Commission</b>	Projects required and Order of Conditions that do not fall within the categories listed above
<b>Building Inspector</b>	Projects requiring a Building Permit the do not fall within the categories listed above

**B) Stormwater Regulations.** The Stormwater Authority may adopt, and periodically amend, rules and regulations relating to the terms, conditions, definitions, enforcement, fees (including application, inspection, and/or consultant fees), procedures and administration of this Stormwater Bylaw by majority vote of the Stormwater Authority, after conducting a public hearing to receive comments on any proposed revisions. Such hearing dates shall be advertised in a newspaper of general local circulation, at least fourteen (14) days prior to the hearing date. After public notice and public hearing, the Stormwater Authority may issue rules and regulations to fulfill the purposes of this Bylaw. Failure by the Stormwater Authority to issue such rules and regulations or a legal declaration of their invalidity by a court shall not act to suspend or invalidate the effect of this Bylaw.

**C) Stormwater Management Manual.** The Stormwater Authority will utilize the policy, criteria and information including specifications and standards of the latest edition of the Massachusetts Stormwater Management Policy (see Appendix B), to execute the provisions of this Bylaw. This Policy includes a list of acceptable stormwater treatment practices, including the specific design criteria for each. The Policy may be updated and expanded periodically, based on improvements in engineering, science, monitoring, and local maintenance experience. Unless specifically altered in the Stormwater Regulations, stormwater management practices that are designed, constructed, and maintained in accordance with these design and sizing criteria will be presumed to be protective of Massachusetts water quality standards to the extent authorized.

**D) Actions by the Stormwater Authority.** The Stormwater Authority may take any of the following actions as a result of an application for a Stormwater Management Permit: Approval, Approval with Conditions, Disapproval, or Disapproval without Prejudice.

**E) Appeals of Action by the Stormwater Authority.** A decision of the Stormwater Authority shall be final. Further relief of a decision by the Stormwater Authority made under this Bylaw shall be reviewable in the Superior Court in an action filed within sixty (60) days thereof, in accordance with M.G.L. Ch. 249 § 4.

**F) Right of Entry.** Filing and application for stormwater management permit grants the Stormwater Authority or its designee permission to enter the site to verify the information in the application and to inspect for compliance with permit conditions.

#### 4.0- AUTHORITY

This Bylaw is adopted under authority granted by the Home Rule Amendment of the Massachusetts Constitution, and pursuant to the regulations of the Federal Clean Water Act, and as authorized by the residents of the Town of West Boylston at Town Meeting, dated October 15, 2007.

#### 5.0- APPLICABILITY

**A)** This bylaw shall be applicable to all new development and redevelopment; including, but not limited to, site plan applications and subdivision applications. The Bylaw shall apply to any activities that will result in an increased amount of stormwater runoff or pollutants from a parcel of land, or that will alter the drainage characteristics of a parcel of land, unless exempt under Section 5.C of this Bylaw. All new development and redevelopment under the jurisdiction of this Bylaw shall be required to obtain a Stormwater Management Permit.

**B)** An alteration, redevelopment, or conversion of land use to a hotspot (as determined by the Stormwater Authority in conformance with Standard 5 of the Massachusetts Stormwater Management Policy) including, but not limited to, auto salvage yards, auto fueling facilities, fleet storage yards, commercial parking lots with high intensity use, road salt storage areas, commercial nurseries and landscaping, outdoor storage and loading areas of hazardous substances, or marinas, shall require a Stormwater Management Permit.

#### **C) EXEMPTIONS**

No person shall alter land within the Town of West Boylston without having obtained a Stormwater Management Permit (SMP) for the property with the following exceptions:

1. Any activity that will disturb an area less than 10,000 (gross) square feet of all contiguous properties;
2. Normal maintenance and improvement of land in agricultural use as defined by the Wetlands Protection Act regulation 310 CMR 10.04 and MGL Chapter 40A Section 3;
3. Maintenance of existing landscaping, gardens or lawn areas associated with a single, two, or three family dwelling;
4. Repair or replacement of an existing roof;
5. Construction of a single-family dwelling, where approval is not required as defined in the Subdivision Control Law, unless the associated land disturbance activity exceeds 10,000 (gross) square feet. Prior to land disturbance activities, persons constructing single-family dwellings are strongly encouraged to consult with the town's Stormwater Authority about actions to reduce stormwater impacts during and after construction. It is also recommended that individuals constructing single-family dwellings prepare and grade lots in such a manner that development of the lot does not cause detrimental drainage on another lot or onto streets either during construction or upon completion.
6. Repair or replacement of an existing septic system when approved by the Board of Health. Persons repairing or replacing septic systems are strongly encouraged to consult with the Town of West Boylston Board of Health or Conservation Commission about actions to reduce stormwater impacts during and after construction.
7. The construction of any fence that will not alter existing terrain or drainage patterns;
8. Construction of a deck, patio, retaining wall, expansion of an existing driveway, construction of a shed, garage, swimming pool, tennis or basketball court associated with a single, two, or three family dwelling that does not disturb more than 10,000 square feet.

- 9. Construction of utilities (gas, water, electric, telephone, etc.) other than drainage, which will not alter terrain, ground cover, or drainage patterns and for which the total area to be disturbed (even if linear in nature) does not exceed 10,000 sq. ft. at one time, defined as more than one week of exposed surface area;
- 10. Emergency repairs to any stormwater management facility or drainage structure or practice that poses a threat to public health or safety, or as deemed necessary by the Stormwater Authority; and
- 11. Any work or projects for which all necessary approvals and permits have been issued before the effective date of this Bylaw.
- 12. Normal maintenance of Town owned public land, ways, and appurtenances.

**6.0- PROCEDURES**

Permit Procedures and Requirements shall be defined and included as part of any rules and regulations issued as permitted under Section 4 of this Bylaw.

**7.0- ENFORCEMENT**

The Stormwater Authority or its designee shall enforce this Bylaw, regulations, orders, violation notices, and enforcement orders, and may pursue all civil and criminal remedies for such violations. Enforcement shall be further defined and included as part of any Stormwater regulations issued as permitted under Section 4 of this Bylaw.

**8.0- SEVERABILITY**

The invalidity of any section, provision, paragraph, sentence, or clause of this Bylaw shall not invalidate any section, provision, paragraph, sentence, or clause thereof, nor shall it invalidate any permit or determination that previously has been issued.

**9.0- APPLICATION FEES**

The Stormwater Authority shall receive with each submission an Application Fee ESTABLISHED BY THE Stormwater Authority to cover expenses connected with the review of the Stormwater Management Permit and a technical review fee sufficient to cover professional review services for the project. The Stormwater Authority is authorized to retain a Registered Professional Engineer or other professional consultants to advise the Stormwater Authority on any or all aspects of these plans. Applicants must pay review fees before the review process may begin.

**10.0- WAIVERS**

- A. The Stormwater Authority may waive strict compliance with any requirement of this bylaw or the rules and regulations promulgated hereunder, where:
  - 1) Such action is allowed by federal, state, and local statutes and/or regulations
  - 2) Is in overriding public interest, and
  - 3) Is not inconsistent with the purpose and intent of this bylaw.
- B. Any applicant may submit a written request to be granted such a waiver. Such a request shall be accompanied by an explanation or documentation supporting the waiver request and demonstrating that strict application of the bylaw does not further the purposes or objectives of this bylaw.

**APPENDIX A: DEFINITIONS**

ALTER: Any activity, which will measurably change the ability of a ground surface area to absorb water or will temporarily or permanently change existing surface drainage patterns. Alter may be similarly represented as “alteration,” “alteration of drainage characteristics,” and “conducting land disturbance activities.”

BEST MANAGEMENT PRACTICE (BMP): Structural, non-structural and managerial techniques that are recognized to be the most effective and practical means to prevent and/or reduce increases in stormwater volumes and flows, reduce point source and nonpoint source pollution, and promote stormwater quality and protection of the environment. “Structural” BMPs are devices that are engineered and constructed to provide temporary storage and treatment of stormwater runoff. “Non-structural” BMPs are measures to reduce pollution levels through managerial measures that reduce impacts through sound planning, design, or operational standards. Non-structural BMPs do not require extensive construction efforts, but they do promote pollutant reduction by eliminating or reducing the pollutant source.

**BETTER SITE DESIGN:** Approaches and techniques used as non-structural BMPs that can reduce a site’s impact on the watershed through the use of nonstructural stormwater management practices. Better site design includes conserving and protecting natural areas and greenspace, reducing impervious cover, and using natural features for stormwater management.

**HOTSPOT:** Land uses or activities with higher potential pollutant loadings, such as, but not limited to, auto salvage yards, auto fueling facilities, fleet storage yards, commercial parking lots with high intensity use, road salt storage areas, commercial nurseries and landscaping, outdoor storage and loading areas of hazardous substances, or marinas.

**MASSACHUSETTS STORMWATER MANAGEMENT POLICY:** The Policy issued by the Department of Environmental Protection, as amended, that coordinates the requirements prescribed by state regulations promulgated under the authority of the Massachusetts Wetlands Protection Act M.G.L. c. 131§ 40 and Massachusetts Clean Waters Act M.G.L. c. 21, §. 23-56. The Policy addresses stormwater impacts through implementation of performance standards to reduce or prevent pollutants from reaching water bodies and control the quantity and quality of runoff from a site.

**NEW DEVELOPMENT:** Any construction or land disturbance of a parcel of land that is currently in a natural vegetated state and does not contain alteration by man-made activities.

**NONPOINT SOURCE POLLUTION:** Pollution from many diffuse sources caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it transports natural and human-made pollutants, finally depositing them into wetland and/or water resource areas.

**PERSON:** 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, the Town of West Boylston, and any other legal entity, its legal representatives, agents, or assigns.

**PRE-DEVELOPMENT:** The conditions that exist prior to clearing or grading of a site at the time that plans for the land development of a tract of land are submitted to the town. Where phased development or plan approval occurs (preliminary grading, roads and utilities, etc.), the existing conditions at the time prior to the first plan submission shall establish pre-development conditions.

**POST-DEVELOPMENT:** The conditions that reasonably may be expected or anticipated to exist after completion of the land development activity on a specific site or tract of land. Post development refers to the phase of a new development or redevelopment project after completion, and does not refer to the construction phase of a project.

**RECHARGE:** The replenishment of underground water reserves.

**REDEVELOPMENT:** Any construction, alteration, or improvement exceeding land disturbance of 10,000 (gross) square feet, where the existing land use is commercial or industrial.

**STORMWATER AUTHORITY:** The Town of West Boylston Stormwater Authority or its authorized designees. The Stormwater Authority or its designee is responsible for coordinating the review, approval and permit process as defined in this Bylaw. The Stormwater Authority shall be the West Boylston Director of Public Works. All powers granted to or duties imposed upon the Stormwater Authority are extended to the Stormwater Authority’s designees. The Stormwater Authority’s designees for various projects that disturb more than 10,000 square feet are as follows:

<b>Designee</b>	<b>Projects Distributing More 10,000 Square Feet</b>
-----------------	--

<b>Planning Board</b>	Subdivisions, Site Plans
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<b>Zoning Board of Appeals</b>	Special Permits, Variances, 40B
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<b>Earth Removal Board</b>	Earth Removal Permits
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<b>Conservation Commission</b>	Projects required and Order of Conditions that do not fall within the categories listed above
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**Building Inspector** Projects requiring a Building Permit the do not fall within the categories listed above

STORMWATER MANAGEMENT PERMIT (SMP): A permit issued by the Stormwater Authority, after review of an application, plans, calculations, and other supporting documents, which is designed to protect the environment of the Town from the deleterious effects of uncontrolled and untreated stormwater runoff. *A19 Oct 15, 2007*

#### ***ARTICLE XXXIV- Housing Partnership Committee***

##### MEMBERSHIP

There is hereby established a Housing Partnership Committee of the Town of West Boylston. The Trustees of the West Boylston Affordable Housing Trust shall serve as the members of the Housing Partnership Committee. The Housing Partnership Committee shall have a chairperson selected by a majority vote of the members. The Housing Partnership Committee may have such subcommittees and ad hoc committees as the Housing Partnership Committee may choose to create. *A6 OCT 18, 2010*

##### MEETINGS

- a) Meetings of the Members. All meetings of the members shall be held at an Americans with Disabilities Act compliant place within the Town.
- b) Notice. The Housing Partnership Committee shall comply with the provisions of the Open Meeting Law, G.L. c.39, §23B.

##### DUTIES

- a) The Housing Partnership Committee shall study the needs for affordable housing and recommend procedures for the development and implementation of the Town's Affordable Housing policy. The Housing Partnership Committee shall consult with the Town Administrator and existing municipal boards, including the Select Board members, Town-Wide Planning Committee, Zoning Board of Appeals, Planning Board, Open Space Committee, Conservation Commission and other boards, committees and agencies as the Housing Partnership Committee may determine.
- b) The Housing Partnership Committee shall act as the Town's initial contact with developers of proposed affordable residential housing projects which are site-specific and for which the developer has indicated an intention to request an increase in allowed density or other variances in return for said provision of affordable housing. In this context, the Housing Partnership Committee will serve as the preliminary negotiating agency of the Town.
- c) The Housing Partnership Committee may also initiate action intended to create and endorse affordable residential housing projects. In this context the Housing Partnership Committee may work to implement a specific project consistent with the Town's housing strategy.

##### QUORUM

A majority of the authorized membership of the Housing Partnership Committee shall constitute a quorum, but a smaller number may adjourn finally or from time to time without further notice until a quorum is secured. If a quorum is present, a majority of the members present may take action on behalf of the Housing Partnership.

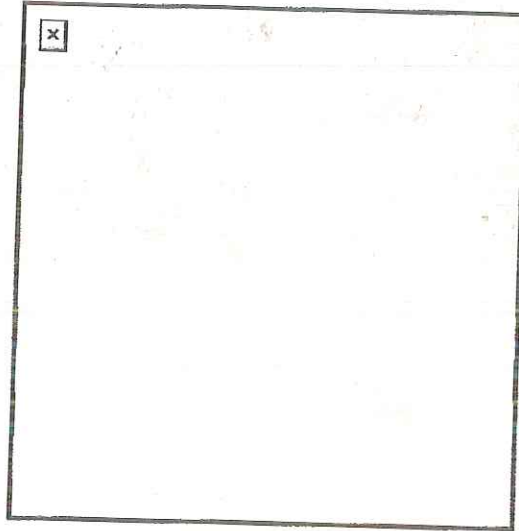
##### QUALIFICATIONS

All members of the Housing Partnership Committee shall be residents of West Boylston. Each member of the Housing Partnership Committee shall serve for a term of two (2) years. Any member of the Housing Partnership Committee may be removed for cause. *A9 Oct 20, 2008, A6 OCT 20, 2010*



# Town of West Boylston

## Sewer Use Regulations



West Boylston Sewer Commissioners

1998

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## **SEWER USE REGULATIONS**

REGULATIONS GOVERNING THE USE OF PUBLIC AND PRIVATE SEWERS AND DRAINS, PRIVATE SEWAGE DISPOSAL, THE INSTALLATION AND CONNECTION OF BUILDING SEWERS, AND THE DISCHARGE OF WATERS AND WASTES INTO THE PUBLIC SEWER SYSTEM; AND PROVIDING PENALTIES FOR VIOLATIONS THEREOF; IN THE TOWN OF WEST BOYLSTON, WORCESTER COUNTY, COMMONWEALTH OF MASSACHUSETTS.

Be it ordained and enacted by the **Sewer Commission** of the Town of West Boylston, of the Commonwealth of Massachusetts, as follows:

### **ARTICLE 1 - DEFINITIONS**

Unless the context specifically indicates otherwise, the meaning of terms used in these regulations shall be as follows:

- 1.1 "BOD" (denoting Biochemical Oxygen Demand) shall mean the quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedure in five (5) days at 20°C, expressed in milligrams per liter.
- 1.2 "Building Drain" shall mean that part of the lowest piping of a drainage system which receives the discharge of wastewater from inside the walls of the building and extends to ten (10) feet outside the inner face of the building wall.
- 1.3 "Building Sewer" shall mean the extension from the building drain to the public sewer or other place of disposal, also called house or building connection.
- 1.4 "City" shall mean the city of Worcester, Massachusetts.
- 1.5 "Commission" shall mean the Sewer Commission of the town of West Boylston or any agent or officer duly authorized to act in its place.
- 1.6 "DEP" shall mean the Department of Environmental Protection or any agent or officer duly authorized to act in its place.
- 1.7 "District" shall mean the Upper Blackstone Water Pollution Abatement District or any agent or officer duly authorized to act in its place.
- 1.8 "Easement" shall mean an acquired legal right for the specific use of land owned by others.
- 1.9 "Floatable Oil" is oil, fat, or grease in a physical state such that it will separate by gravity from wastewater by treatment in an approved pre-treatment facility. A wastewater shall be considered free of floatable oil if it is properly pretreated and the wastewater does not interfere with the collection system.
- 1.10 "Garbage" shall mean the animal and vegetable waste resulting from the handling, preparation, cooking, and serving of foods.
- 1.11 "Holden" shall mean the town of Holden or any agent or officer duly authorized to act in its place.
- 1.12 "Industrial Wastes" shall mean the wastewater from industrial processes, trade, or business as distinct from domestic (sanitary) wastes.
- 1.13 "Natural Outlet" shall mean any outlet, including storm sewers into a watercourse, pond, ditch, lake, or other body of surface or groundwater.
- 1.14 "May" is permissive (see "Shall", 1.25).
- 1.15 "MDC" shall mean the Metropolitan District Commission or any agent or officer duly authorized to act in its place.
- 1.16 "NPDES Permit" shall mean the discharge permit issued to a treatment works pursuant to the National Pollution Discharge Elimination System.

1.17 "Person" shall mean any individual, firm, company, association, society, corporation, partnership, group, or any political subdivision of the Commonwealth.

1.18 "pH" shall mean the negative logarithm of the hydrogen ion concentration. The concentration is the weight of hydrogen ions, in grams, per liter of solution. Neutral water, for example, has a pH value of 7 and a hydrogen ion concentration of  $10^{-7}$ .

1.19 "Properly Shredded Garbage" shall mean the wastes from the preparation, cooking, and dispensing of food that have been shredded to such a degree that all particles will be carried freely under the flow conditions normally prevailing in public sewers, with no particle greater than 1/2 inch in any dimension.

1.20 "Public Sewer" shall mean a common sewer controlled by a governmental agency or public entity.

1.21 "(Sanitary) Sewer" shall mean a pipe or conduit that carries liquid and water-carried wastes from residences, commercial buildings, industrial plants, and institutions together with minor quantities of ground, storm, and surface waters that are not admitted intentionally.

1.22 "Septage" shall mean the wastes from holding tanks such as chemical toilets, campers, or trailers; and wastes from septic tanks and cesspools.

1.23 "Sewage" is the used water of a community. The preferred term is "wastewater", (see 1.32).

1.24 "Sewer" shall mean a pipe or conduit that carries wastewater.

1.25 "Shall" is mandatory (see "May", **1.14**).

1.26 "Sludge" shall mean the waste solids from a wastewater treatment facility.

1.27 "Slug" shall mean: a) Any discharge of water or wastewater which, in concentration of any given constituent or in quantity of flow, exceeds five (5) times the average twenty-four (24) hour concentration or five (5) times the normal operating flow for more than fifteen (15) minutes and adversely affects the collection system and/or the performance of the wastewater treatment works. b) Any discharge at a flow rate or concentration which could cause a violation of the prohibited discharge standards in Article III Section 3 of the Upper Blackstone Water Pollution Abatement District's regulations or any discharge of a non-routine, episodic nature, including but not limited to, an accidental spill or a non-customary batch discharge.

1.28 "Storm Drain" (sometimes termed "storm sewer") shall mean a pipe or conduit for conveying stormwater, groundwater, subsurface water, or unpolluted water from any source.

1.29 "Superintendent" shall mean the **Superintendent** of the **Sewer Department** of the Town of West Boylston or his authorized deputy, agent, or representative.

1.30 "Suspended Solids" shall mean total suspended matter that either floats on the surface of, or is in suspension in, water, wastewater, or other liquids, and that is removable by laboratory filtering as prescribed in "Standard Methods for the Examination of Water and Wastewater" and referred to as nonfilterable residue.

1.31 "Town" shall mean the town of West Boylston, Massachusetts or any duly authorized officer, agent or representative of the town of West Boylston.

1.32 "Unpolluted Water" is water of quality equal to or better than the effluent criteria in effect or water that would not cause violation of receiving water quality standards and would not be benefitted by discharge to the sewers and wastewater treatment facilities provided.

1.33 "Wastewater" shall mean the used water of a community and may be a combination of the liquid and water-carried wastes from residences, commercial buildings, industrial plants, and institutions together with any minor quantities of groundwater, surface water, and stormwater that are not admitted intentionally.

1.34 "Wastewater Facilities" shall mean the structures, equipment, and processes required to collect, transport, and treat domestic and industrial wastes and dispose of the effluent.

1.35 "Wastewater Treatment Facility" shall mean an arrangement of devices and structures for treating wastewater, industrial wastes, and sludge. Sometimes used as synonymous with "waste treatment plant" or "wastewater treatment plant" or "water pollution control plant".

1.36 "Watercourse" shall mean a natural or artificial channel for the passage of water either continuously or intermittently.

## **ARTICLE 2 - USE OF PUBLIC SEWERS REQUIRED**

2.1 It shall be unlawful to discharge directly to any natural outlet within the town of West Boylston, or in any area under the jurisdiction of said Town, any wastewater or other polluted water, without the applicable state and federal discharge permits.

2.2 As stipulated by the Board of Health it shall be unlawful for property owners to construct or repair any privy, privy vault, septic tank, cesspool, or other facility intended or used for the disposal of wastewater where a public sewer is within one hundred (100) feet of the property line and where permission to enter such sewer can be obtained from the authority having jurisdiction over it.

2.3 The owners of all houses, buildings, or properties used for human occupancy, employment, recreation, or other purposes, situated within the Town and abutting on any street, alley, or right-of-way in which there is now located or may in the future be located a public sewer of the Town, are hereby required at their expense to install suitable toilet facilities therein, and to connect such facilities directly with the proper public sewer in accordance with the provisions of these regulations within ninety (90) days after date of receipt of official notice from the Board of Health acting under the provisions of Title 5 of the "State Environmental Code for the Commonwealth of Massachusetts, Minimum Requirements for the Subsurface Disposal of Sanitary Sewage" or regulations relative

thereto, provided that the public sewer is within one hundred (100) feet of the property line. Said connections shall be made without exception, unless the requirement is waived in accordance with Board of Health Regulations

### ARTICLE 3 - PRIVATE SEWAGE DISPOSAL

3.1 Where a public sewer is not available under the provisions of Section 2.3, the building sewer shall be connected to a private wastewater disposal system complying with the requirements of the Board of Health and/or the Massachusetts Department of Environmental Protection.

### ARTICLE 4 - BUILDING SEWERS AND INSTALLATION

4.1 No person(s) shall uncover (excavate), make any connections to, or opening into, use, alter, or disturb any public sewer or appurtenances thereof without first obtaining a written permit from the **Superintendent**. Any person proposing a new discharge into the public sewer or a change in the volume or character of pollutants that are being discharged into the public sewer shall notify the **Superintendent** and the District at least forty-five (45) days prior to the proposed change or connection.

4.2 There shall be two (2) classes of building sewer installation permits: (a) for residential and commercial service and (b) for service to establishments producing industrial waste flow (see "Industrial Waste," Section **1.12**) or any flow greater than 25,000 gallons per day. In either case, the owner(s) or his agent shall make a permit application to the **Superintendent** and the District. The permit application shall be supplemented by plans, specifications, or other information considered pertinent in the judgement of the **Superintendent**. A permit application fee which shall include the routine costs associated with the inspection of the building sewer installation, by the **Superintendent**, shall be paid to the Town at the time the application is filed. Permit application fees shall be levied as follows:

- a. Residential & Commercial (less than or equal to 25,000 gpd): \$
- b. Industrial waste flow (or any flow greater than 25,000): \$

The **Superintendent** shall grant permits to applicants proposing to connect building sewers to the public sewers in accordance with the terms of these regulations.

The **Superintendent** shall keep a complete record, in books made for that purpose, of permits granted, giving the name of the street, the number of the estate if any, the name of the owner, the size, kind, and location of the building sewers and other private sewers connected to the public sewers, the name of the drainlayer making the connection, and of other such facts as may

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connection to the public sewer. The connection and testing shall be made under the supervision of the **Superintendent** or his representative, and no backfilling is allowed until all appropriate inspections are made. If the pipe trench is backfilled before required inspection occurs, then the pipe shall be exposed for inspection.

4.13 All excavations for building sewer installation shall be guarded adequately with barricades and lights so as to protect the public from hazard. Streets, sidewalks, parkways, and other public property disturbed in the course of the work shall be restored in a manner satisfactory to the Town.

4.14 No person shall lay any building sewer to other private sewer or make any connection into any public sewer unless such person is duly licensed to lay said sewer by the Town licensing authority.

4.15 No person duly licensed to construct building and other private sewers and make connections with public sewers shall incur the penalty stipulated in the licensing authority's regulations.

- Any drainlayer violating any provision of these Regulations shall incur the penalty stipulated in the licensing authority's regulations.
- Installation and use of any grinder pump unit shall conform with the attached Grinder Pump Use Regulations.

## ARTICLE 5 - USE OF THE PUBLIC SEWERS

5.1 No person(s) shall discharge or cause to be discharged any unpolluted waters such as stormwater, surface water, groundwater, roof runoff, subsurface drainage or uncontaminated cooling water to any sanitary sewer.

5.2 No person(s) shall discharge or cause to be discharged any of the following described waters or wastes to any public sewers:

5.2.1 Any gasoline, benzene, naphtha, fuel oil, or other flammable or explosive liquid, solid, or gas including but not limited to wastestreams with a closed cup flashpoint of less than 140°F or 60°C using the test methods specified in 40 CFR 261.21.

5.2.2 Any waters containing toxic or poisonous solids, liquids, or gases in sufficient quantity, either singly or by interaction with other wastes, to injure or interfere with any waste treatment process, constitute a hazard to humans or animals, create a public nuisance, cause acute worker health and safety problems within the wastewater facilities or create any hazard in the receiving waters of the wastewater treatment plant.

5.2.3 Any water or wastes having a pH lower than 6.5, or having any other corrosive property capable of causing damage or hazard to structures, equipment, and personnel of the wastewater facilities.

5.2.4 Solid or viscous substances in quantities or of such size capable of causing obstruction to the flow in sewers, or other interference with the proper operation of the wastewater facilities such as, but not limited to, ashes, bones, cinders, sand, shavings, shells, mud, straw, metal, glass, rags, feathers,

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6.1 The attached Article IV of the District Revised Sewer and Pretreatment Regulations shall govern industrial pretreatment and discharge permit requirements for the town of West Boylston.

#### **ARTICLE 7 - PROTECTION FROM DAMAGE**

7.1 No person(s) shall maliciously, willfully, or negligently break, damage, destroy, uncover, deface, or tamper with any structure, appurtenance or equipment which is a part of the wastewater facilities of the Commission or the District. Any person(s) violating this provision shall be subject to all civil or criminal penalties as provided by Massachusetts General Laws or these regulations.

7.2 No unauthorized person shall enter or remain in or upon any land or structure used for wastewater facilities of the Commission or District. Any person violating this provision shall be subject to immediate arrest under charge to trespass.

#### **ARTICLE 8 - POWERS AND AUTHORITY OF INSPECTORS**

8.1 The **Superintendent** and other duly authorized employees or agents of the Commission or District bearing proper credentials and identification shall be permitted to enter, at reasonable times, all private properties connected with public sewers for the purposes of inspection, observation, measurement, sampling, and testing pertinent to discharge to the wastewater facilities in accordance with the provisions of these regulations. They may inquire into any processes including metallurgical, chemical, oil, refining, ceramic, paper, plating, or other industrial activity that contribute waters or wastes to the public sewers, and to inspect and copy records.

8.2 The **Superintendent** or other duly authorized employees or agents of the Commission or District are authorized to obtain information concerning industrial processes which have a direct bearing on the kind and source of discharge to the wastewater facilities. The industry may withhold information considered confidential. However, the industry must establish that disclosure of the information in question to the public might result in an advantage to competitors.

8.3 While performing the necessary work on private properties referred to in Section 8.1, the **Superintendent** or duly authorized employees or agents of the Commission or District shall observe all safety rules applicable to the premises.

8.4 The **Superintendent** and other duly authorized employees or agents of the Commission or District bearing proper credentials and identification shall be



permitted to enter all private properties through which the Town holds an easement for the purposes of, but not limited to, inspection, observation, measurement, sampling, repair, and maintenance of any portion of the wastewater facilities lying within said easement. All entry and subsequent work, if any, on said easement, shall be done in full accordance with the terms of the easement pertaining to the private property involved.

## **ARTICLE 9 - PENALTIES**

9.1 Whenever on the basis of information available to it, the Commission or District finds any person to be violating any provision of these regulations, the Commission or District may take any or all of the following actions:

9.1.1 Issue an order to cease and desist any such violation;

9.1.2 Issue an implementation schedule ordering specific actions to be taken and time schedule;

9.1.3 Fine said person up to \$5,000.00 per day for each violation pursuant to M.G.L. Chapter 83, Section 10;

9.1.4 Bring a civil or criminal action as provided by law;

9.1.5 Take any other action available to it under federal, state, or local laws or regulations.

9.2 Any person violating the provisions of these regulations shall become liable to the Commission or District and/or District for any expense, loss, or damage incurred by the Commission or District and/or District by reasons of such violation, including but not limited to any fines, charges, or assessments made or imposed on the Town by federal, state, or local agency.

## **ARTICLE 10 - VALIDITY**

10.1 The invalidity of any section, clause, sentence, or provisions of these regulations shall not affect the validity of any other part of these regulations which can be given effect without such invalid part or parts.

10.2 These regulations do not supersede regulations of the District.

## **ARTICLE 11 - APPEALS**



**Rules and Regulations  
Governing the Subdivision of Land  
in West Boylston, MA**

March 14, 2007

**PREAMBLE: PURPOSE**

The *Subdivision Control Law, M.G.L. c. 41, §§81K-81GG*, was enacted for the purpose of protecting the safety, convenience and welfare of the inhabitants of the cities and towns in which it has been put into effect by (1) regulating the laying out and construction of ways in subdivisions providing access to the lots therein; and (2) ensuring sanitary conditions in subdivisions and, in proper cases, parks and open areas.

The powers of the Planning Board under the Subdivision Control Law are intended to be exercised with due regard for:

- i. the provision of adequate access to all of the lots in a subdivision by ways that will be safe and convenient for travel;
- ii. lessening congestion in such ways and in the adjacent public ways;
- iii. reducing danger to life and limb in the operation of motor vehicles;
- iv. securing safety in the case of fire, flood, panic and other emergencies;
- v. ensuring compliance with the applicable zoning bylaw;
- vi. securing adequate provisions for water, sewerage, drainage, underground utility services, fire, police, and other similar municipal equipment, and street lighting and other requirements where necessary in a subdivision; and
- vii. coordinating the ways in a subdivision with each other and with the public ways in the city or town in which it is located and with the ways in neighboring subdivisions.

Any subdivision plan filed with the Planning Board shall receive the approval of the Planning Board if the plan conforms to the recommendations of the Board of Health and to these Rules and Regulations; provided, however, that, pursuant to *M.G.L. c.41, §81R* and section VIII.A of these Rules and Regulations, the Planning Board may, when appropriate, waive such portions of the rules and regulations as it deems advisable.

**SECTION I            AUTHORITY**

*A.     ADOPTION AND ADMINISTRATION*

Under the authority vested in the Planning Board of the Town of West Boylston, Massachusetts, by *M.G.L. c. 41, §81Q*, the Planning Board originally adopted these Rules and Regulations Governing the Subdivision of Land in the Town of West Boylston on October 5, 1954.

1.     The Planning Board shall be responsible for administration of these regulations and shall have all the powers assigned to it by *M.G.L. c.41, §§81K-81GG*.
  
2.     The Planning Board, in conjunction with § VIII.B. herein and at the cost of the applicant, may hire Consultant Engineers, construction inspectors, legal counsel, or other professional assistance and may assign as its Agents appropriate Town Agencies or officials to review plans and applications filed pursuant to these Rules and Regulations or to inspect the construction or installation of improvements requested hereunder.

*B.     INTERPRETATION*

In interpreting these regulations the Planning Board shall consider the general character of the Town of West Boylston, encourage coordination with the Master Plan of the Town, and seek to mitigate the impacts of subdivision construction throughout the Town.

*C.     SEVERABILITY*

If any section, paragraph, sentence, clause or provision of these Rules and Regulations shall be adjudged not valid, the adjudication shall apply only to the material so adjudged and the remainder of these regulations shall be deemed to remain valid and effective.

*D.     INVALIDATION BY STATE LAW*

Any part of these Rules and Regulations subsequently invalidated by a new state law or modification of an existing state law shall automatically be brought into conformity with the new or amended law, and shall be deemed to be effective immediately without recourse to a public hearing and the customary procedures for amendment or repeal of such regulations.

*E.     AMENDMENTS*

These Regulations or any portion thereof may be amended, supplemented, or repealed from time to time by the Planning Board after a public hearing on its own motion or by petition.

**SECTION II            DEFINITIONS**

In construing these Rules and Regulations, the definitions set forth in *M.G.L. c. 41, §81L* shall apply unless a contrary intention clearly appears in either the West Boylston zoning bylaw or these Rules and Regulations. In addition, the following words shall have the following meanings:

***ABUTTERS***

Owners of: (1) land sharing a common property line of a proposed subdivision; and (2) land directly across a street or road from such subdivision or property; or (3) land abutting other land described in this paragraph, if located within 300 feet of the property before the Planning Board.

***ANCHORED MULCH***

Erosion control measure consisting of straw, woodchips, emulsifier and other appropriate materials bound together and secured to the surface with staples, pegs and twine, or screen or fabric.

***APPLICANT***

The person, individual, partnership, corporation, trust, agency, department, political subdivision, or other legal entity who applies for approval of a plan or the endorsement of a plan. The Applicant must be the owner of all the land included in the plan for which approval of the Planning Board is requested, except that an agent, representative or assignee may act for the owner.

***AQUIFER AND WATER PROTECTION DISTRICT***

The zoning overlay district as defined in the Zoning Bylaws of the Town of West Boylston at Section 2.6.

***BASIN***

A temporary or permanent area formed by excavation or embankment to which water is directed to increase detention time and/or allow settling of suspended solids.

***CLEAR***

The act of removing vegetative cover in a manner that does not disturb root mat or the existing soil surface.

***CONSTRUCTION INSPECTOR***

A person appointed by the Planning Board to inspect the construction and installation of the improvements required by Section VII of these Rules and Regulations for an approved subdivision.

*SECTION II: DEFINITIONS*

***CONSULTING ENGINEER***

A Professional Engineer appointed by the Planning Board to assist the Planning Board in the review of any application filed under these Rules and Regulations or to inspect the construction or installation of the improvements required by Section VII of these Rules and Regulations for an approved subdivision.

***CUT***

The excavation, trenching, or digging of soil, sand, gravel, stones, or other earth material from the land.

***DEAD END STREET***

A street or portion thereof that joins another street at only one end.

***EARTH REMOVAL BYLAW***

Section 5.4 of the Zoning Bylaws of the Town of West Boylston.

***ENGINEER***

A Registered Professional Engineer qualified and registered by the Commonwealth of Massachusetts.

***EROSION***

The process by which the ground surface is worn by natural forces such as wind, water, ice, gravity, glaciers or by artificial means, such as recreational uses and construction activities.

***FILL***

Any soil, earth, sand, gravel, rock or any similar material that is deposited, placed, pushed or pulled onto a site.

***FLOODPLAIN OVERLAY DISTRICT***

The zoning overlay district as defined in the Zoning Bylaws of the Town of West Boylston at Section 2.5.

***GRADE***

Degree of inclination of land expressed as a percentage or ratio.

***GRADING***

Any act by which material is cut or filled or soil is cleared, stripped, stockpiled, or any combination thereof.

***INDUSTRIAL STREET***

A street providing access to and within commercial and industrial areas as they may exist or as they may be zoned. This classification is further divided into "primary industrial streets" and "secondary industrial streets."

***LAND-DISTURBING ACTIVITY***

*SECTION II: DEFINITIONS*

Any action that causes the alteration of earth, sand, rock, gravel, vegetation or similar material on land.

***LAND SURVEYOR***

A Registered Land Surveyor qualified and registered by the Commonwealth of Massachusetts.

***LOCAL RESIDENTIAL STREET***

A street serving no more than ten (10) private residences and designed primarily for passenger vehicles and light trucks.

***LOT***

A contiguous area of land in one ownership with definite boundaries shown on a plan or deed.

***LOW IMPACT DEVELOPMENT (LID)***

An innovative approach to stormwater management in which an attempt is made to duplicate the hydrologic regime of an undeveloped watershed. This approach is implemented by engineering a site so that the post-development hydrologic functions remain close to pre-development conditions by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source.

***ONE -HUNDRED -YEAR FLOODPLAIN***

An area delineated under the Federal Emergency Management Act (FEMA) showing the extent of flooding because of a 100-year storm, or the calculated water elevation during the 100-year, 24-hour storm where the Federal Emergency Management Agency has not mapped the floodplain extent. This calculation is to be performed by a Registered Professional Engineer.

***OWNER***

The owner of record as shown by the records of the Worcester County Registry of Deeds or Land Court.

***PLANNING BOARD***

The Town of West Boylston Planning Board.

***PRACTICABLE***

Available and feasible considering cost, existing technology and logistics based on the overall purpose of the project.

*SECTION II: DEFINITIONS*

***PRIMARY INDUSTRIAL STREET***

A street serving as a major access into and/or through a commercial, business or industrial district.

***PUBLIC WAY***

An existing way that has become public in character:

- a. by public authority in the manner provided in *M.G.L. c.82, §§1-32*; or
- b. by prescription; or
- c. by dedication and acceptance, prior to the enactment of Chapter 203 of the Acts of 1846, *M.G.L. c.84, §23*.

***RESIDENTIAL FEEDER STREET***

A street serving general residential areas connecting local residential streets with existing Town streets and highways and other existing or potential local streets.

***SECONDARY INDUSTRIAL STREET***

All other streets in commercial or industrial districts not qualifying as a primary industrial street.

***SEDIMENT***

Organic material or minerals transported or deposited by the movement of wind, water, ice, gravity, glaciers or by artificial means.

***SEDIMENT TRAP***

A temporary basin designed to intercept stormwater and allow suspended particles to settle.

***SLOPE***

The angle of the inclined surface of a fill, excavation, or natural terrain.

***SOIL***

Any earth, sand, rock, gravel, or similar material.

***STRIP***

Any activity that removes the vegetative surface cover including but not limited to tree removal, clearing, grubbing and storage or removal of topsoil.

***SUBDIVISION***

The division of a tract of land into two or more lots. The term shall include resubdivision, and, when appropriate to the context, shall relate to the process of subdivision or the land or territory subdivided; provided, however, that the division of a tract of land into two or more lots shall not be deemed to constitute a subdivision if, at the time when it is made, every lot within the tract so divided has frontage on:



**SECTION II: DEFINITIONS**

- a. a public way or a way which the Town certifies is maintained and used as a public way, or
- b. a way shown on a plan heretofore approved and endorsed in accordance with the subdivision control law, or
- c. a way in existence when the Subdivision Control Law became effective in the Town of West Boylston, having, in the opinion of the Planning Board, sufficient width, suitable grades and adequate construction to provide for the needs of vehicular traffic in relation to the proposed use of the land abutting thereon or served thereby, and for the installation of municipal services to serve such land and the buildings erected or to be erected thereon.

Such frontage shall be of at least such distance as then required by zoning by-law of the Town of West Boylston for erection of a building on such lot, and if no distance is so required, such frontage shall be of at least twenty feet. Conveyances or other instruments adding to, taking away from, or changing the size and shape of, lots in such a manner as not to leave any lot so affected without the frontage above set forth, or the division of a tract of land on which two or more buildings were standing when the Subdivision Control Law went into effect in the Town of West Boylston into separate lots on each of which one or such buildings remains standing, shall not constitute a subdivision.

**WETLAND RESOURCE AREA**

Those resource areas subject to the *Wetlands Protection Act, M.G.L. c.131, §40* that are enumerated in 310 CMR 10.02(1)(a-f).

**SECTION III PLANS NOT REQUIRING APPROVAL UNDER THE SUBDIVISION CONTROL LAW**

*A. APPLICATION*

Any Applicant who wishes to cause to be recorded a plan of land and who believes that such plan does not require approval under the Subdivision Control law shall:

1. File with the Planning Board, at one of its regularly scheduled meetings:
  - a. two copies of a properly executed Form A (see Forms) accompanied by the necessary evidence to show that the plan does not require approval;
  - b. the plan printed on a mylar transparency sheet, in the form set forth in Section III.B of these Rules and Regulations, and six (6) contact prints thereof;
  - c. a filing fee (see Fee Schedule);

No plan shall be deemed to have been submitted until all requirements of Section III.A.1.a-c have been satisfied.

2. Give written notice to the Town Clerk by delivery in hand or certified mail, postage prepaid, that the Plan has been submitted to the Planning Board. The date such completed application is delivered to the Planning Board at one of its regularly scheduled meetings shall be deemed to be the date of submission of the Plan Not Requiring Approval Under the Subdivision Control Law.

*B. FORM AND CONTENT OF PLAN*

The plan shall be prepared in black ink upon mylar transparency sheets of suitable dimensions. The plan shall contain the following information:

1. The proposed locus plan, north point, date, scale, legend, and the title "Plan of Land;"
2. The names and addresses of the record owner or owners of the property shown on the plan and the Applicant, if not the owner; the date or dates of acquisition of the property; all deed references; the Town Assessor's sheet number and parcel number for the property; and the name, signature and appropriate seal of the engineer or land surveyor who prepared the plan;

3. All property boundary lines adjacent to the proposed subdivision;
4. The zoning classification of the property, and the location of any zoning district boundary lines that lie in the vicinity of the property, including any variances, exceptions or other decisions issued for the property or for any existing or proposed building or structure thereon by the West Boylston Board of Appeals or a court of competent jurisdiction;
5. Proposed lot lines within the property shown on the plan, with approximate areas and dimensions, including frontage, of such lots, and a number on each lot, including the entirety of any lot proposing to have its boundaries changed.
6. The location of all existing property lines, structures, streets, ways, and easements on or abutting the land.
7. The statement "Planning Board Approval under the Subdivision Control Law Not Required" and sufficient space for the date and endorsement of the Planning Board, with the following statement immediately above or below such space:

*NO DETERMINATION AS TO COMPLIANCE WITH ZONING REQUIREMENTS HAS BEEN MADE OR INTENDED BY THE PLANNING BOARD'S ENDORSEMENT OF THIS PLAN.*

*C. DETERMINATION THAT APPROVAL NOT REQUIRED*

If the Planning Board determines that the plan does not show a subdivision of land pursuant to *M.G.L. c.41, §§81K-81GG*, it shall, without a public hearing and within twenty-one (21) days of submission, endorse on the plan the words: "Planning Board Approval Under the Subdivision Control Law Not Required." This endorsement does not imply that the plan complies with the Zoning Bylaw of the Town of West Boylston. The signed original of said plan shall be returned to the Applicant and the Planning Board shall notify the Town Clerk, in writing, of its action within twenty-one (21) days after submission of the plan. (See Form E if approval is required.)

*D. DETERMINATION THAT APPROVAL IS REQUIRED*

If the Planning Board determines that the plan does show a subdivision of land pursuant to *M.G.L. c.41, §§81K-81GG*, it shall, within 21 days of submission of said plan, so inform the Applicant and the Town Clerk (see Form E), in writing, of its determination and shall return the plan to the Applicant.

## SECTION IV PRELIMINARY PLANS

A Preliminary Plan of a residential subdivision MAY, and a Preliminary Plan of a non-residential subdivision SHALL, be submitted by an Applicant for discussion and approval, modification or disapproval. The submission of a Preliminary Plan will enable the Applicant, the Planning Board, other municipal agencies and abutters to discuss and clarify any problems of the proposed subdivision before a Definitive Plan is prepared. The Planning Board's policy is to pursue resolution of as many subdivision issues as possible prior to submission of a Definitive Plan. During its review of the Preliminary Plan, the Planning Board will promote cooperative discussion among all affected citizens and officials of as many such issues as possible. Therefore, it is strongly recommended that a Preliminary Plan be filed in most cases, even if not required by these Rules and Regulations.

### A. APPLICATION

Any Applicant who desires approval of a Preliminary Plan for the subdivision of property shall:

1. File with the Planning Board, at one of its regularly scheduled meetings:
  - a. A copy of a properly executed Form C (see Forms);
  - b. A copy of the Preliminary Plan satisfying the form and content requirements set forth in section IV.B of these Rules and Regulations, with eleven (11) copies distributed as noted below; and
  - c. A filing fee (see Fee Schedule in effect at the date of filing).

The date such completed application is delivered to the Planning Board at one of its regularly scheduled meetings shall be deemed to be the date of submission of the Preliminary Plan.

2. Give written notice to the Town Clerk, by delivery in hand or by registered or certified mail, postage prepaid, of the filing of the Preliminary Plan, accompanied by a copy of the plan, and the original of the Form C filed with the Planning Board. The written notice shall specify:
  - a. The date the Preliminary Plan was filed with the Planning Board;
  - b. A description of the property to which the Preliminary Plan is related, sufficient for identification thereof; and
  - c. The name and address of the owner of such property.

3. Submit a copy of plans, the written notice given to the Town Clerk, and the Form C filed with the Planning Board to:
  - a. The Commissioners of the West Boylston Water District
  - b. The Director of the Department of Public Works
  - c. The Fire Chief
  - d. The Police Chief
  - e. The Conservation Commission
  - f. The Inspector of Buildings
  - g. The Town's Consultant Engineer
  - h. The Manager of the Municipal Lighting Plant
  - i. The Board of Sewer Commissioners
  - j. The Board of Health

If any Town official or agency to whom notice is not required to be given by this section requests copies of the plan, the Planning Board may require the Applicant to submit the plan to such Town official or agency. If the plan pertains to property subject to protection under the *Watershed Protection Act*, St. 1992, c.36, codified at *M.G.L. c.92, §§104, 107A, 108, 113 and 113A*, the Applicant shall also submit the plan to the Division of Water Supply Protection of the Department of Conservation and Recreation 180 Beaman Street, West Boylston, MA 01583.

*B. FORM AND CONTENT OF THE PRELIMINARY PLAN*

The Preliminary Plan shall be drawn in black ink on one or more 24-inch by 36-inch sheets, at a suitable scale. If a Preliminary Plan is drawn on multiple sheets, it shall be accompanied by an index sheet showing the entire proposed subdivision and, in such case, matching lines and consecutive numbers shall be provided. The Preliminary Plan shall contain the following information:

1. The proposed subdivision name, boundaries, locus plan, north point, date, scale, legend, and the title "Preliminary Plan;"

SECTION IV: PRELIMINARY PLANS

2. The names and addresses of the record owner or owners of the property shown on the Preliminary Plan and the Applicant, if not the owner; the date or dates of acquisition of the property; all deed references; the Town Assessor's sheet number and parcel number for the property; and the name, signature and appropriate seal of the engineer or land surveyor who prepared the Preliminary Plan;
3. All property boundary lines adjacent to the proposed subdivision;
4. The zoning classification of the property, and the location of any zoning district boundary lines that lie in the vicinity of the property, including any variances, exceptions or other decisions issued for the property or for any existing or proposed building or structure thereon by the West Boylston Board of Appeals or a court of competent jurisdiction; and including any zoning overlay districts.
5. Existing and proposed easements, covenants or restrictions applying to the property, together with a statement of the purpose thereof, including setbacks and other general dimensional requirements set forth in the West Boylston Zoning Bylaw;
6. The location and boundaries of any land subject to the protections of the *Wetlands Protection Act*, c.131, §40, as amended by the *Rivers Protection Act*, St. 1996, c.258, or the *Watershed Protection Act*, St. 1992, c.36, codified at *M.G.L. c.92, §§104, 107A, 108, 113 and 113A*.
7. The location of all significant, permanent, existing or proposed property features, including topography, natural objects and surfaces, such as stone walls, fences, buildings, structures, historic sites, rock ridges, ledge outcroppings, large boulders, steep slopes, trees larger than 15-inches in diameter, wells, subsurface sewage disposal systems, wetland resource areas, 100-year flood plan boundaries, natural drainage courses, waterways and bodies of water.
8. Existing and proposed boundaries of streets, ways, and any public or common areas within the proposed subdivision;
9. The names, location, and present widths of all streets within 500 feet of the proposed subdivision;
10. Proposed lot lines within the proposed subdivision, with approximate areas, frontage and dimensions of, and a number on each lot;
11. Evidence that each lot on the plan, or altered by it, will have the requisite area and frontage required by the West Boylston Zoning Bylaw;

*SECTION IV: PRELIMINARY PLANS*

12. Identification of parcels that are not to be made into lots, with an indication of whether these parcels should be considered buildable or if they are to be conveyed to adjacent lands.
13. The size and location of existing and proposed water mains, sewer lines, storm drains and appurtenant facilities for water, sewer and other municipal services within or in the vicinity of the proposed subdivision;
14. Existing and proposed drainage systems within or in the vicinity of the proposed subdivision;
15. Frontage and area of any remaining adjoining land owned by the Applicant;
16. Suitable space to record the action of the Planning Board and the signatures of the members of the Planning Board.
17. If the Applicant owns or controls unsubdivided land adjacent to the property shown on the Preliminary Plan, a sketch plan showing a possible or prospective street layout for such adjacent land shall accompany the Preliminary Plan. This sketch plan may be submitted on a separate sheet from the Preliminary Plan.

*C. PRELIMINARY PLAN APPROVAL*

As soon as practicable after the date of its submission, the Planning Board shall study the Preliminary Plan and discuss it with the Applicant. Failure to complete the application requirements or to provide the Planning Board with any information it requests shall be grounds for disapproval. Within 45 days of submission of the Preliminary Plan, the Planning Board shall approve the Preliminary Plan with or without modifications or conditions suggested by the Planning Board or Board of Health or agreed upon by the Applicant, or shall disapprove the Preliminary Plan, giving the reason or reasons for such disapproval. Such decision shall be sent to the Applicant by certified mail. The time within which the Planning Board must act on a Preliminary Plan may be extended by the Planning Board upon written request of the Applicant or his agent.

Approval of a Preliminary Plan does not constitute approval of the proposed subdivision. If the Preliminary Plan is approved, all Rules and Regulations of the Planning Board in effect at the time of its submission shall govern the Definitive Plan that results from such Preliminary Plan, provided that such Definitive Plan is submitted within seven (7) months of the submission of the Preliminary Plan.

*D. NOTICE OF ACTION ON PRELIMINARY PLAN*

The Planning Board shall send notice of each action taken pursuant to Section IV.C of these Rules and Regulations to the Town Clerk and the Applicant.



## **SECTION V            DEFINITIVE PLANS**

No person shall make a subdivision of any property or proceed with the improvement or sale of lots in a subdivision, or the construction of ways, or the installation of municipal services therein, unless a Definitive Plan of such subdivision has been submitted to and approved by the Planning Board in accordance with this section.

### *A.        APPLICATION*

Any Applicant who desires approval of a Definitive Plan for the subdivision of property shall:

1.        File with the Planning Board, at one of its regularly scheduled meetings:
  - a.        A properly executed Form B (see Forms);
  - b.        The Definitive Plan, satisfying the form and content requirements set forth in section V.B of these Rules and Regulations, with three (3) sets of calculations for Drainage, or Traffic, or Economic Impact (when required); with eleven (11) contact prints of the Definitive Plan distributed as noted below;
  - c.        A designer's certificate, Form D (see Forms);
  - d.        A Certified abutters list, Form J (see Forms), showing the names and addresses of all abutters to the property included in the Definitive Plan, as determined from the most recent Assessor's list unless the Applicant has more recent knowledge of such abutters;
  - e.        A Form K (See Forms) for Proposed Street Names; and
  - f.        A filing fee (see Fee Schedule in effect on the date of filing);
2.        File with the Board of Health:
  - a.        A copy of the Form B filed with the Planning Board; and
  - b.        One (1) contact print of the Definitive Plan filed with the Planning Board.
3.        File with the Sewer Commissioners:
  - a.        A copy of the Form B filed with the Planning Board; and
  - b.        Two (2) contact prints of the Definitive Plan filed with the Planning Board.

SECTION V: DEFINITIVE PLANS

4. Give written notice to the Town Clerk, by delivery in hand or by registered mail, postage prepaid, of the filing of the Definitive Plan, accompanied by a copy of the Definitive Plan, and the original of the Form B previously filed with the Planning Board. The written notice shall specify:
  - a. The date the Definitive Plan was filed with the Planning Board;
  - b. A description of the property to which the Definitive Plan is related, sufficient for identification thereof; and
  - c. The name and address of the owner of such property.

The date such completed application is delivered to the Planning Board at one of its regularly scheduled meetings shall be deemed to be the date of submission of the Definitive Plan.

5. Submit a copy of the Definitive Plan, the written notice given to the Town Clerk, the Form B filed with the Planning Board, and a copy of Form M1 (see Forms) to:
  - a. The Commissioners of the West Boylston Water District.
  - b. The Director of the Department of Public Works
  - c. The Fire Chief
  - d. The Police Chief
  - e. The Conservation Commission
  - f. The Inspector of Buildings
  - g. The Town's Consultant Engineer
  - h. The Manager of the Municipal Lighting Plant

If any Town official or agency to whom notice is required to be given by this section requests copies of the plan, the Planning Board may require the Applicant to submit the plan to such Town official or agency. If the plan pertains to property subject to protection under the *Watershed Protection Act*, St. 1992, c.36, codified at M.G.L. c.92, §§104, 107A, 108, 113 and 113A, the Applicant shall also submit the plan to the Division of Water Supply Protection of the Department of Conservation and Recreation 180 Beaman Street, West Boylston, MA 01583.

*B. FORM AND CONTENT OF THE DEFINITIVE PLAN*

The Definitive Plan shall be drawn in black ink on one or more 24-inch by 36-inch mylar transparency sheets at a scale of 1-inch to every 40-feet or such other scale as the Planning Board may approve, except that sections and details may be shown to whatever scale as will ensure clarity. If a Definitive Plan is drawn on multiple sheets, it shall be accompanied by an index sheet showing the entire proposed subdivision and, in such case, match lines and consecutive numbers shall be provided.

The Definitive Plan shall be adequate to readily determine the location, direction and length of every street and way line, lot line, boundary and municipal service facility within or adjacent to the proposed subdivision and to reproduce or locate them on the ground. All bearings shall be true, magnetic, or grid, and the needle as shown on the plan shall so indicate. The Definitive Plan shall contain the following information:

1. A map of the vicinity of the proposed subdivision drawn to a convenient scale between 1"=800' and 1"=200' inclusive to show on one sheet all of the proposed subdivision, all of other adjacent land of the applicant and other adjacent properties to the nearest existing street in every direction. Important ground features such as brooks, public areas, lot lines, easements and streets only need be shown in a general manner and labeled. No dimensions need be given except where of specific importance in evaluating the subdivision. The limits of the proposed subdivision shall be indicated by a heavy line or by use of shading, and existing and proposed features should be distinguished by different lines, labeling or other methods;
2. The proposed subdivision name, boundaries, locus plan, north point, date, scale, legend, designation of each drawing with reference to the matter shown thereon, and the title "Definitive Plan;"
3. The names and addresses of the record owner or owners of the property shown on the Definitive Plan and the Applicant, if not the owner; the date or dates of acquisition of the property; all deed references; the Town Assessor's sheet number and parcel number for the property; and the name, signature and appropriate seal of the engineer or land surveyor who prepared the Definitive Plan;
4. All property boundary lines adjacent to the proposed subdivision, including all deed references;

*SECTION V: DEFINITIVE PLANS*

5. The zoning classification of the property, and the location of any zoning district boundary lines that lie in the vicinity of the property, including any variances, exceptions or other decisions issued for the property or for any existing or proposed building or structure thereon by the West Boylston Board of Appeals or a court of competent jurisdiction; and including any zoning overlay districts;
6. Existing and proposed easements, covenants or restrictions applying to the property, together with a statement of the purpose thereof, including setbacks and other dimensional requirements set forth in the West Boylston Zoning Bylaw;
7. Existing and proposed topography of the property proposed to be subdivided with 2 foot contour intervals unless otherwise specified by the Planning Board. Where possible, all elevations shall be National Geodetic Vertical Datum of 1929, the Horizontal Datum shall be NAD 1983, and, where possible, show the bench marks used and their elevations;
8. The location of all permanent existing or proposed monuments and property features, including natural objects and surfaces, including stone walls, fences, buildings, structures, historic sites, rock ridges, ledge outcroppings, large boulders, steep slopes, trees larger than 15 inches in diameter, wells, subsurface sewage disposal systems, wetland resource areas, 100-year floodplain boundaries and flood elevations, natural drainage courses, waterways and bodies of water. Groundwater elevation and the bottom elevation of all streams and water bodies within the subdivision shall be given and ground surfaces identified as to type and spot elevations of high and low points shall be shown and identified. Existing and proposed contours shall be shown on the same drawing whenever excavation or fill in excess of two feet depth will be necessary at any lot in the subdivision. Said contours shall be shown in two-foot intervals using dashed lines for existing and solid lines for proposed contours. The contours must correspond to the existing and proposed grades of street shown on profile drawings;
9. Such points or boundary markers as were found in the traverses and/or perimeter surveys after a thorough search has been made;
10. Existing and proposed boundaries of streets, ways, and any public or common areas within the proposed subdivision. The proposed names of all streets within the proposed subdivision shall be shown in pencil until they have been approved by the Planning Board. All proposed streets or ways shall be mathematically tied into the layout of the nearest acceptable local, county or state road;
11. The names, location, and present widths of all streets within 500 feet of the proposed subdivision;

SECTION V: DEFINITIVE PLANS

12. Proposed lot lines within the proposed subdivision, with approximate areas, frontage and dimensions of, and a number on each lot;
13. Evidence that each lot on the plan, or altered by it, will have the requisite area and frontage required by the West Boylston Zoning Bylaw;
14. Identification of parcels that are not to be made into lots, with an indication of whether these parcels should be considered buildable or if they are to be conveyed to adjacent lands;
15. Reference to any required documents such as the vote, covenant, easements deeded to the Town, etc. shall be inscribed on the plan;
16. Suitable space to record the action of the Planning Board, including space for reference to any considerations or limitations of approval, the date, the signatures of the members of the Planning Board, and the Town Clerk's certificate of no appeal;
17. The location and boundaries of any land subject to the protections of the *Wetlands Protection Act*, c.131, §40, as amended by the *Rivers Protection Act*, St. 1996, c.258, or the *Watershed Protection Act*, St. 1992, c.36, codified at M.G.L. c.92, §§104, 107A, 108, 113 and 113A;
18. The volume of earth to be removed in accordance with the requirements of the Earth Removal Board, or a statement that no earth is to be removed during construction of the proposed subdivision;
19. Existing and proposed drainage systems within or in the vicinity of the proposed subdivision, including all public and private flowage rights, accompanied by drainage calculations prepared, stamped and signed by a registered professional engineer, which shall include design criteria, drainage area and other information sufficient for the Planning Board to verify the adequacy of any proposed drain, drainfield, culvert, catch basin, detention or retention basin, other stormwater management facility, or bridge, and a completed and stamped Stormwater Management Form (<http://www.mass.gov/dep/appkits/wpaappb.doc>) to verify compliance with all the Stormwater Management Standards itemized by the Department of Environmental Protection for all proposed development (no exemptions);
20. Proposed provisions for handling any surface water that drains onto streets adjacent to the proposed subdivision or onto any property not owned by the Applicant, in such a manner as not to create drainage problems and comply with the Town Driveway regulations;
21. Street and utility construction plans and profiles for each street, consisting of the layout plan of the street within the subdivision or beyond it to the limit of the

proposed construction necessary to provide adequate access and connection of municipal services, and of a profile matching the layout and located whether above or below it for ease in locating corresponding points:

- a. The plan shall show all street sidelines, centerlines, corner roundings, turnarounds (clearly identifiable as permanent or temporary), showing the length of each straight segment to the nearest one-hundredth of a foot and the bearing thereof to the nearest five seconds of arc, and the length, central angle, radius, length of tangents for each curved segment to the same degree of precision as the straight lines and clearly identifying all non-tangent curves. The centerline of the roadway shall coincide with the centerline of the right-of-way. The plan shall also show and clearly identify as such all existing and proposed construction features, such as pavement, walks, curbing, drains, catch basins, manholes, water mains, other underground conduits where known, retaining walls, traffic islands, grass plots, bituminous berms and gutters. Centerline stations shall be designated at 100 foot intervals and at or opposite points of tangency, angles in street line, manholes, catch basins and culverts.
  - b. The profile shall show the existing sidelines and existing and proposed centerlines with elevations every 50 feet and at all high and low points, and all proposed drains, catch basins, manholes, cleanouts, siphons and other appurtenances identifying the material, class or strength, and size of drains and the rate of grade for each section thereof in percent and giving centerline stations and invert elevations of all catch basins, manholes, cross drains or culverts. The lines and figures relating to the proposed centerline shall be in red or other reproducible colored drawing ink.
  - c. All crossings of wetland resources or stream areas must have a detailed cross-section prepared with the following information: depth of organic soils, proposed limits of work and excavation, culvert location and size, and any other available data pertinent to the design of the crossing.
22. The size and location of existing and proposed water mains, sewer lines, storm drains and appurtenant facilities for water, sewer and other municipal services within or in the vicinity of the proposed subdivision;
  23. Detail drawings: any special construction features, deviating from or not covered by standard specifications, shall be shown on detail drawings. Such detail drawings may be incorporated as part of a utility plan or profile information as to dimensions, locations, inverts, rim elevations, elevations, materials, etc., of all construction details involved. The requirement for detail drawings shall be applicable, but not limited to, roadway cross sections, bridges, culverts, structurally stabilized slopes, utility piping encased in concrete, ditches and brooks shaped or constructed to a definite cross-

- section, dams and spillways, steps within the exterior lines of the street and similar construction features;
24. Construction details of appurtenances, structures, and/or utilities and other pertinent information, as approved in conjunction with the approval of the Definitive Plan.
  25. A plan for the control of erosion and sedimentation, as required by section VI.L of these Rules and Regulations;
  26. All Definitive Plan submissions shall include a plan, with narrative, for operation and maintenance of the subdivision right-of-ways, easements and roads for the time prior to acceptance by the Town. The maintenance is the responsibility of the owner until the roadway is accepted at Town Meeting. The maintenance plan should include provision for the maintenance of road pavement, soil settling problems, street sweeping, snowplowing, maintaining vegetative stabilization of all right-of-ways and easements, erosion controls, fall leaf cleanup, catch basins, detention basins, drainage system cleaning, and other provisions as determined to be necessary by the Planning Board.
  27. If the Applicant owns or controls unsubdivided land adjacent to the property shown on the Definitive Plan, a sketch plan showing a possible or prospective street layout for such adjacent land shall accompany the Definitive Plan. This sketch plan may be submitted on a separate sheet from the Definitive Plan.
  28. Identify and map natural features and critical environmental resources; Delineate potential building envelopes avoiding natural features and environmental resource areas and appropriate buffers; and Develop methods to minimize impervious surfaces, and to protect and preserve open space (i.e. document LID development).
  29. If the proposed subdivision is not to be serviced entirely by the West Boylston Sewer System, a permit to construct a subsurface sewage disposal system to service each lot not to be so serviced shall be obtained from the Board of Health, and a condition shall be inscribed on the Definitive Plan as follows: "No building or structure shall be placed or built on any lot not serviced by the West Boylston Sewer System without a subsurface sewage disposal system permit from the West Boylston Board of Health."

*C. OTHER STUDIES*

In addition to the submissions required by section V.A of these Rules and Regulations, the Planning Board may require an Applicant to submit a traffic study and/or a local impact study of the proposed subdivision. Such traffic study shall conform to the scope specified by the Planning Board and shall be submitted, at least 15 days prior to the scheduled public hearing on the proposed subdivision, to the Planning Board, the Department of Public Works, the Fire

Chief and the Police Chief for their review and comment, either on Form M1 (see Forms) or otherwise. Said local impact study shall address local environmental impacts, and financial impacts on town systems such as the schools, roadways, municipal services, and infrastructure.

*D. OTHER INFORMATION*

The Planning Board may require the Applicant to furnish such additional information as may, in the opinion of the Planning Board, be necessary to evaluate the feasibility of the proposed design of the subdivision. Such information may include the results of any tests or copies of calculations used in design, reasons for excessive fill or excavation, cross-sections of excavation of fill areas, copies of agreements granting the Applicant rights essential to development of the land and construction work involved, including the right of access over existing ways, or any analysis of environmental impacts prepared pursuant to *M.G.L. c.30, §§61-62H* or another comparable statute.

*E. REPORT OF THE BOARD OF HEALTH*

Within 45 days of the submission of the Definitive Plan, the Board of Health shall report to the Planning Board in writing its approval or disapproval of the Definitive Plan, or recommendations for modification thereof or conditions to be required thereof. In the event of disapproval or recommendation for modification or conditions, the Report shall include specific findings of fact in support of the Board of Health's conclusions.

Failure by the Board of Health to report to the Planning Board within 45 days of the submission of the Definitive Plan shall be deemed to constitute approval of the Definitive Plan by the Board of Health.

Approval by the Board of Health by any means of the Definitive Plan does not constitute an approval of a permit to construct or use an individual subsurface sewage disposal system on any lot, nor should it be construed to be an application for such permit. Any proposed subdivision that is not to be serviced entirely by the West Boylston Sewer System must obtain a permit from the Board of Health to construct an individual subsurface sewage disposal system for each lot that will not be serviced by the West Boylston Sewer System.

*F. COMMENTS OF OTHER TOWN OFFICIALS*

Within 30 days of the submission of the Definitive Plan, any of the Town officials and commissions to whom notice is required to be given by section V.A.5 of these Rules and Regulations may submit a Form M1 to the Planning Board including any recommendations for approval, disapproval or modification of the Definitive Plan, or conditions recommended to be required thereof.



*SECTION V: DEFINITIVE PLANS*

1. In the event that any such Town official or commission fails to submit such Form M1 or other written comments, the Applicant shall submit a written statement to the Planning Board noting the actions and dates that:
  - a. The Applicant has offered to meet with such official or commission to discuss the Definitive Plan; and
  - b. The official or commission has declined to meet with the Applicant or has identified no problems with the proposed subdivision.
  
2. Where appropriate, the Form M1 or other written comments submitted by the West Boylston Water District shall include comments advising the Planning Board regarding the availability of an adequate water supply to service the proposed subdivision; whether the Applicant should be required to install particular water facilities; and the approximate estimated cost of construction of such facilities and of connecting to the Town water system. To enable the West Boylston Water District to prepare such comments in a timely fashion, the Applicant shall submit to the District, together with the items specified in section V.A.5 of these Rules and Regulations, a plan showing in detail the proposed water service main and a detailed water utility impact study, prepared by a qualified professional engineer, showing:
  - a. The proposed water system for the proposed subdivision, including analysis of flows, pressures, and other applicable hydraulic data; and
  - b. The proposed subdivision's impact on existing water facilities (whether located on the site or not).

3. Where appropriate, the Form M1 submitted by the Director of the Department of Public Works shall include comments advising the Planning Board regarding the approvals that the Director of the Department of Public Works will require in connection with the subdivision; any improvements to existing streets and ways that are made necessary by the development of the proposed subdivision; and the approximate estimated cost of construction of such improvements and of the streets and ways shown in the Definitive Plan. Where appropriate, the Form M1 submitted by the Director of the Department of Public Works shall also include comments advising the Planning Board regarding the availability of adequate sewage disposal capacity to service the proposed subdivision; whether the Applicant should be required to install particular sewer facilities; and the approximate estimated cost of construction of such facilities and of connecting to the West Boylston Sewer System. To enable the Director of the Department of Public Works to prepare such comments in a timely fashion, the Applicant may be required to submit, together with the items specified in Section V A.5 of these Rules and Regulations, a plan showing in detail the proposed sewer service main and a detailed utility impact study, prepared by a qualified Professional Engineer, showing:
  - a. The proposed sewer system for the proposed subdivision, including analysis of flows, pressures and other applicable data; and
  - b. The proposed subdivision's impact on existing sewer facilities (whether located on the site or not.)
  
4. Where appropriate, the Form M1 submitted by the Fire Chief shall include comments advising the Planning Board regarding the Definitive Plan's proposed street names and configurations, hydrant locations, special water supply facilities, water flow tests and any other matter pertaining to the safety and welfare of the public. To enable the Fire Chief to prepare such comments in a timely fashion, the Applicant shall submit to the Fire Chief, together with the items specified in section V.A.5 of these Rules and Regulations, documentation demonstrating:
  - a. The quantity of water presently available at the site for fire suppression purposes.
  - b. That the proposed subdivision will comply with either i. or ii. listed below:
    - i. the water supply is capable of satisfying requirements stipulated by the National Fire Protection Association (NFPA) in the latest edition of the following standards:
      - a. NFPA 13-D when a residential sprinkler system is permitted and installed, or

- b. NFPA 13 when a conventional sprinkler system is installed, or
  - c. NFPA 1231 when the building is not equipped with a sprinkler system; or
  - ii. a satisfactory compliance alternative has been prepared by a qualified fire protection engineer.
  - c. The proposed subdivision's fire protection features will comply with all provisions set forth in the latest edition of NFPA 1141, and
  - d. All applicable requirements of the current edition of the State Building Code and the General Laws affecting fire safety will be complied with.
5. Where appropriate, the Form M1 submitted by the Police Chief shall include comments advising the Planning Board regarding the Definitive Plan's proposed street names and configurations, and any other matter pertaining to the safety and welfare of the public.
6. Where appropriate, the Form M1 submitted by the Conservation Commission shall include comments advising the Planning Board regarding the approvals that the Conservation Commission will require in connection with the subdivision.

*G. PUBLIC HEARING*

Upon determination by the Planning Board that the application for approval of the Definitive Plan is complete, the Planning Board shall set a date for the public hearing and so notify the Applicant. Notice of the hearing shall be arranged by the Planning Board, at the Applicant's expense, by advertisement in a newspaper of general circulation in West Boylston in each of two successive weeks, the first publication being not less than 14 days before the day of the hearing, and by mailing, by certified mail, return receipt requested, not less than 14 days before the date of hearing, a copy of the advertisement to all abutters.

*H. HOMEOWNERS ASSOCIATION*

If the Subdivision Plan includes drainage and stormwater management appurtenances outside of the public right-of-way, such as detention ponds, a Homeowners Association must be constituted to maintain these structures. The Town of West Boylston does not intend to accept maintenance beyond the roadway right of way. Accordingly, a Declaration of a Homeowner's Covenant must be created and provided for approval by the Planning Board's Counsel. An Operations and Maintenance Plan for these drainage structures must be provided for review by the Planning Board's Consulting Engineer. The Declaration of Homeowner's Covenant

must be recorded at the Worcester Registry of Deeds with the subdivision plan and reference to the covenant must be noted on the plans.

*I. PERFORMANCE GUARANTEE*

1. Types of Accepted Surety

Before endorsement of the Board's approval of a Definitive Plan of a subdivision, the Applicant shall agree to complete the required improvements specified in Section VII for any lots in a subdivision, such construction and installation to be secured by one, or in part by one, and in part by another of the following methods which from time to time may be varied by the applicant with the written consent of the Planning Board:

- a. **by a Proper Bond**, sufficient in the opinion of the Board to secure performance of the construction of ways, and the installation of municipal services required for lots in the subdivision shown on the Plan, and the Board may require that the Applicant specify the time within which such construction shall be completed.
- b. **by a Deposit of Money or negotiable securities**, sufficient in the opinion of the Board to secure performance of the construction of ways, and the installation of municipal services required for lots in the subdivision shown on the Plan, and the Board may require that the Applicant specify the time within which such construction shall be completed. Such monies would be deposited with the Municipal Treasurer and placed in a separate account.
- c. **by a Covenant**, executed and duly recorded by the owner of record, running with the land, whereby such ways and services shall be provided to serve any lot before such lot may be built upon, or conveyed, other than by mortgage deed; provided that a mortgagee who acquired title to the mortgaged premises by foreclosure or otherwise, and any succeeding owner of such premises or part thereof may sell any such lot, subject to that portion of the covenant which provided that no lot shall be built upon until such ways and services have been provided to serve such lot; and provided, further, that nothing herein shall be deemed to prohibit a conveyance by a single deed, subject to such covenant, of either the entire parcel of land shown on the subdivision plan, or all lots not previously released by the Board. A deed of any part of the subdivision in violation hereof shall be voidable by the grantee prior to the release of the covenant, but not later than three years from the date of such deed. Such Covenant shall be referred to on the plan and recorded in the Registry of Deeds. The Applicant shall send a copy of the covenant, showing the book and page on which it is recorded to the Planning Board within seven (7) days of recording.
- d. by delivery to the Board of an agreement executed after the recording of a first mortgage covering the premises shown on the plan, or a portion thereof given as security for advances to be made to the Applicant by the lender, which agreement,

shall be executed by the Applicant and the lender, and shall provide for the retention by the lender of funds sufficient in the opinion of the Board and otherwise due the Applicant, to secure the construction of ways, and the installation of municipal services. Said agreement shall also provide for a schedule of disbursements which may be made to the Applicant upon completion of various stages of the work, and shall further provide that in the event the work is not completed within the time set forth by the Applicant, any funds remaining undisbursed shall be available for completion.

2. Such bond or security shall be approved as to form and manner of execution by Town Counsel, and as to bonds, by the Town Treasurer, and shall be contingent upon the completion of the specified improvements within no more than one year from occupancy of the first house, or date of deposit agreement, whichever is earlier. Failure to complete such improvements may constitute grounds for rescission of approval of the Definitive Plan.

3. Reduction of Surety Bond

The penal sum of any such bond held under clause (1.a), or any deposit held under clause (1.b), or any amount of funds retained pursuant to an agreement under clause (1.d) shall bear a direct and reasonable relationship to the expected cost including the effects of inflation, necessary to complete the subject work. Such amount or amounts shall from time to time be reduced so that the amount bonded, deposited or retained continues to reflect the actual expected cost of work remaining to be completed.

4. Release of Performance Guarantee

Upon the completion of improvements required under Section VII, security for performance of which was given in accordance with Section V.I.1, clauses (a), (b), (c), or (d), the Applicant shall send by Registered Mail to the Town Clerk and the Planning Board a written statement that the said construction or installation in connection with which such bond, deposit, or covenant has been given has been completed in accordance with the requirements contained under Section VII, such statements to contain the address of the Applicant. If the Planning Board, after its final inspection, determines that said construction or installation has been completed, it shall notify the Town Treasurer in writing that it releases the interest of the Town in such bond or deposit; and that such bond or deposit shall be returned to the person or persons who furnished same; or release the covenant, by appropriate instrument, duly acknowledged, which may be recorded. However, the Town shall hold ten percent (10%) of the value of the performance guarantee for one (1) year after the completion of construction, or until the Town accepts the streets, whichever comes first. Prior to releasing the Town's interest in accordance with Section V.I.1, clauses (a), (b), (c) or (d), the Planning Board shall receive from the Applicant the following written approval, or thirty (30) days shall elapse after the request for said approval without action:

- a. from the Planning Board Agent as to construction of all ways and sidewalks, installation of monuments, street signs, lights, gutters, curbs, required grading and drainage, planting and seeding;
- b. from the Board of Health as to the installation of sewage disposal facilities or/and from the Department of Public Works as to the installation of sewers, as appropriate;
- c. from the water supplier as to the installation of water facilities; and
- d. from the Conservation Commission as to the installation of erosion & sediment control measures and post-construction stormwater management practices.

If the Planning Board determines that said construction or installation has not been completed, it shall specify to the Applicant and to the Town Clerk, in writing by Registered Mail, the details wherein said construction and installation fail to comply with the requirements of the Subdivision Rules and Regulations. Upon failure of the Planning Board to act on such application within forty-five (45) days after receipt of the written statement from the Applicant by the Town Clerk, all obligations under the bond shall cease and terminate by operation of law, any deposit shall be returned, and any such covenant shall become void.

In the event that said forty-five (45) day period expires without such specification or without release and return of the deposit or release of the covenant as aforesaid, the Town Clerk shall issue a certificate to such effect, duly acknowledged, which may be recorded.

*J. DEFINITIVE PLAN APPROVAL*

In the case of a nonresidential subdivision where a Preliminary Plan has been duly submitted and acted upon or where forty-five days has elapsed since submission of the said Preliminary Plan, and then a Definitive Plan is submitted, the failure of the Planning Board either to take final action or to file with the Town Clerk a certificate of such action regarding the Definitive Plan submitted by an applicant within ninety (90) days after such submission, or such further time as may be agreed upon at the written request of the Applicant, shall be deemed to be an approval thereof. In the case of a subdivision showing lots in a residential zone, where a Preliminary Plan has been acted upon by the Planning Board or where at least forty-five (45) days has elapsed since submission of the Preliminary Plan, an Applicant may file a Definitive Plan. The failure of the Planning Board either to take final action or to file with the Town Clerk a certificate of such action on the Definitive Plan within ninety (90) days after such submission, or such further time as may be agreed upon at the written request of the applicant, shall be deemed to be an approval thereof. In the case of a subdivision showing lots in a residential zone, where no Preliminary Plan has been submitted and acted upon or where forty-five (45) days has not elapsed since submission of such Preliminary Plan, and a Definitive Plan is submitted, the failure of the Planning Board either to take final action or to file with the Town Clerk a certificate of such action regarding the Definitive Plan submitted by an Applicant within one hundred thirty-five (135) days after such submission, or such further

time as may be agreed upon at the written request of the Applicant, shall be deemed to be an approval thereof. Notice of such extensions of time shall be filed forthwith by the Planning Board with the Town Clerk.

After the hearing required by Section V.G and after the report of the Board of Health or lapse of forty-five days without such report, the Planning Board shall approve the Definitive Plan or, if such plan does not comply with the subdivision control law or the Rules and Regulations of the Planning Board or the recommendations of the Board of Health, shall modify and approve, or shall disapprove such plan. In the event of disapproval, the Planning Board shall state in detail, wherein the plan does not conform to the Rules and Regulations of the Planning Board or the recommendations of the Board of Health and shall revoke its disapproval and approve a Plan, which as amended conforms to such Rules and Regulations or recommendations. A Planning Board determination that an application is incomplete or that insufficient information has been supplied by the Applicant shall be grounds for disapproval. The Planning Board, upon written request or agreement of the Applicant or his agent, may extend the time within which the Planning Board must act on the Definitive Plan and such request shall be filed with the Town Clerk. The Planning Board shall file a certificate of its action with the Town Clerk, a copy of which shall be recorded by the Clerk in a book kept for the purpose, and shall send notice of such action by registered mail, postage prepaid, to the Applicant at the address stated on the application.

NOTE: Approval of the Definitive Plan does not constitute the laying out, or acceptance by the Town of streets within a subdivision.

*K. RECORD PLAN*

Final approval of a Definitive Plan, if granted, shall be endorsed on the mylar transparency sheets of the Definitive Plan by the signatures of the majority of the Planning Board within six (6) months, but not until 20 days has elapsed following the filing of the certificate of the action of the Planning Board with the Town Clerk and the Town Clerk has notified the Planning Board that no appeal has been filed. Upon such endorsement, the Planning Board shall, at the Applicant's expense, have printed 6 prints of all endorsed Plans and drawings submitted to the Planning Board in conjunction therewith, as approved, plus three extra key sheets, which plans and drawings shall be plainly marked "Record Plans."

One print of the plan shall be retained in the files of the Board and other prints, with a notation on its action, shall be filed by the Planning Board with the Inspector of Buildings, the Town Clerk, the Board of Health, the Board of Assessors and the Department of Public Works

A copy of the Record Plan shall also be provided to the Planning Board in an electronic digital format, such as AutoCAD or Adobe Portable Document Format (PDF), or other such format acceptable to the Planning Board.

*L. RECORDING OF PLANS*

In accordance with the Subdivision Control Law, Section 81.X, the approved “record plan” and any supplementary documentation shall be recorded by the Applicant at the Worcester County Registry of Deeds or with the Land Court. Proof of this action will be supplied to the Planning Board within seven (7) days of the recording.



## SECTION VI DESIGN STANDARDS

### A. GENERAL

All lots shown on a plan submitted pursuant to these Rules and Regulations shall comply with area, frontage and other requirements of the West Boylston Zoning By-Law and shall conform to the Master Plan of the Town of West Boylston.

Natural features, ledge outcrops, large trees, water courses, scenic points, historic resources and similar community assets that add value and attractiveness to the subdivision and the Town shall be protected and preserved. Low Impact Development will be implemented where possible.

Not more than one building designed or available for use for dwelling purposes shall be erected or placed or converted to use as such on any lot in a subdivision, or elsewhere in the town unless specifically allowed by Town Bylaws.

### B. STREETS

1. Streets within a proposed subdivision shall be continuous, in alignment with existing streets or to the limits of the subdivision so as to provide for future extension in adjacent undeveloped lands where appropriate in the opinion of the Planning Board and to form a convenient system for safe travel. The proposed development shall provide multiple direct connections, i.e. walking and bicycle ways, in its local street system to and between local destinations, such as parks, schools, and shopping, without requiring the use of local feeder roads.
2. No subdivision shall be approved unless the streets therein connect to and are accessible from a public way or an existing private way open to the public and in which the applicant has the necessary rights, nor shall it be approved if the Planning Board determines that such access roads will fail to meet its standards for capability to handle expected additional traffic from said subdivision.
3. Streets shall be designed using the minimum required pavement needed to support travel lanes, on street parking, and emergency, maintenance, and service vehicle access. All streets in the subdivision shall be designed so that, in the opinion of the Planning Board, they will provide safe vehicular travel. Due consideration shall also be given by the subdivider to the attractiveness of the street layout in order to obtain the maximum livability and amenity of the subdivision. The proposed streets shall comprise a convenient system to ensure free circulation of traffic with a minimum number of intersections with primary industrial streets.

SECTION VI: DESIGN STANDARDS

4. Street intersections or jogs with centerline offsets of less than 150 feet, reverse curves, streets of varying width, street intersections at less than 60 degree angle and reserve strips prohibiting access to streets from adjoining property shall not be permitted, except where the Board finds them to be in the public interest.
5. Intersections of street sidelines shall be rounded with a curve of not less than 25 feet radius. All changes in the direction of a street shall be by means of curves in the centerlines with a minimum 100 foot radius.
6. Dead end streets shall not be longer than 750 feet measured along the centerline, from the center line of the intersecting through street to the end of the turnaround, and shall be provided at the closed end with a turnaround having an outside property line diameter of at least 120 feet. Where site conditions are favorable, cul-de-sac islands shall be designed to treat and infiltrate runoff through bioretention. The paved area should be pitched allowing the stormwater runoff to flow into the center bioretention area for treatment and infiltration. The center bioretention area shall be depressed to allow the collection and infiltration of surface runoff. In slowly permeable soils (less than 0.3 inches/hour) a perforated underdrain may be installed at the bottom of the excavation to prevent ponding. Any standards adopted by the Massachusetts Department of Environmental Protection will supercede this clause.
7. Depending on the amount of traffic they will be expected to accommodate, the streets in town, except state highways, shall be classified as local residential, residential feeder, primary industrial and secondary industrial. The classification of a proposed street shall be determined by the Planning Board.
8. Vertical curves are required for all changes in road grade of 2% or greater.
9. Where the street grade at the approach to an intersection of the "lesser" street exceeds four percent (4%), a leveling area shall be provided having a grade not to exceed three percent (3%) for a distance of 50' from the nearest exterior line of the intersecting street.
10. Roadways shall conform to the Typical Roadway Sections (see Plate 1). Design standards shall be as follows:

	<b>Local Residential</b>	<b>Residential Feeder</b>	<b>Industrial Primary</b>	<b>Industrial Secondary</b>
<b>Widths:</b>				
Right-of-way	50 feet	50 feet	60 feet	60 feet
Pavement	22 feet	26 feet	32 feet	26 feet
<b>Mid-centerline Radius:</b>	100 feet	300 feet	500 feet	200 feet

**Grades:**

Minimum	1.0%	1.0%	1.0%	1.0%
Maximum	10.0%	8.0%	6.0%	8.0%
Maximum on Curves	6.0%	4.0%	4.0%	4.0%

**Minimum Stopping Distance:**                      200 feet                      275 feet                      325 feet                      275 feet

**Maximum Number of Lots or Dwelling Units Served:**                      10                      N/A                      N/A                      10

**C.      *SIDEWALKS, BIKEWAYS AND WALKING PATHS***

Sidewalks and walking paths shall not be less than 5 feet in width. Sidewalks shall be constructed on one side of all subdivision streets and ways. Bikeways shall not be less than 8 feet in width and shall be located according to Planning Board recommendations. Where bikeways and sidewalks are separate from the street, the minimum right-of-way shall be 25 feet. The profile, dimensions and location of separately located sidewalks and bikeways shall be subject to the approval of the Planning Board. The grade shall be at least 1 inch above curb elevation. To the extent practicable, permeable paving (porous asphalt or pervious concrete) shall be used for sidewalks, provided the appropriate soil and slope conditions exist. When a sidewalk is constructed of permeable pavement, as approved by the Planning Board, runoff shall be directed away from the sidewalk.

**D.      *WATER SYSTEM***

Water mains, laterals and appurtenances shall be designed to conform with the West Boylston Water District (WBWD) specifications, and to provide adequate water service for the needs of residents and for fire protection. The minimum size of water main shall be 8". Water mains shall connect to municipal water supply system and shall extend to the limits of subdivisions wherever a future continuation into adjacent land is feasible. Whenever possible, the system shall be designed to form a continuous loop with existing or proposed water mains. Hydrants shall be spaced not more than 500 feet apart. The Applicant shall design, furnish and install all water pipes, gates, hydrants, service connections and necessary fittings to conform with WBWD specifications to make a complete system and grant to the Water District a quitclaim deed for the same. Isolation valves are to be spaced not more than 1,000 feet apart and every intersection shall have a separate valve for each direction. Minimum size water service is one (1) inch. Dead ends are to be gated with either a hydrant or permanent blowoff installed.

Before activation, the water system shall be filled, flushed, pressure tested, disinfected (chlorinated/de-chlorinated) where applicable, and bacterial sampling done in accordance with the latest AWWA specifications. Any work related to the water system is to be inspected by the WBWD or its approved agent. Stamped As-Built drawings of the water system are to be submitted to the WBWD prior to acceptance of the system.

E. *STORM WATER MANAGEMENT*

Storm drains, culverts, and related installations, both surface and sub-surface, shall be designed to provide for safe unimpeded flow of natural water courses, drainage of low area along streets and to intercept water runoff along streets at intervals reasonably related to the extent, surface type and grade of the area drained. Certification is required for all developments that the design meets the Stormwater Management Standards specified by DEP in the Massachusetts Stormwater Guidance (no exemptions for smaller projects), as amended. Proper connection shall be provided to the existing drainage system and drains shall be extended to adjacent lands so as to provide for their future continuation. Drainage depending on flow over streets or land outside subdivision shall not be approved unless appropriate easements are first obtained. The minimum drain pipe size shall be 12" and the design velocity of flow shall be no lower than 2.5 feet per second and shall be 3 feet per second where obtainable. Maximum design velocity of flow shall be 15 feet per second.

Catch basins shall be located at both sides of roadway not more than 250 feet apart as necessary for proper interception of water runoff. Catch basins shall not be located at driveway openings. Culverts shall be designed to accommodate a 50-year frequency storm: underground storm drains, catch basins and related installations shall be designed to accommodate a 10-year frequency storm. The 100-year storm shall also be assessed for its impacts on the proposed subdivision, adjacent and downstream properties.

Provisions may be made to construct vegetated open channels in lieu of traditional curbs and gutters, where, in the opinion of the Planning Board, it is appropriate and reasonable. Vegetated open channels may consist of grass channels or dry swales. Grass channels are most appropriate for smaller drainage areas, mildly sloping topography, and housing density less than four (4) dwelling units per acre. Dry swales are most appropriate for high density areas. The Applicant may propose an open or "country drainage" system consisting of drainage swales or surface ditches to convey stormwater runoff from road and driveway surfaces. Such a system will only be considered on residential streets with less than 3% slope and generally permeable soils. The Applicant must submit drainage and hydrologic calculations to demonstrate the system can accommodate a 10-year storm. The 100-year storm shall also be assessed for its impacts on the proposed subdivision and adjacent and downstream properties to demonstrate there will not be unacceptable flooding conditions.

Adequate drainage shall be designed to manage the surface and subsurface water of the roadway and adjoining land. Street drainage designs shall be of the type known as a

“manhole system” unless an open system is proposed. The “manhole system” is one in which the water collected in the catch basins empty into an intermediate manhole in a main drain laid in the street.

The main drain shall also have additional manholes installed at points where changes in direction or grade make such manholes necessary to ensure an uninterrupted flow of water to its final outlet. If it is felt that a variation or modification of the required drainage system is advisable, then the subdivider shall present such varied or modified design to the Planning Board for its adjudication. The design shall include the size, quality, and type of pipe; inlets, manholes, stormwater treatment and detention areas; and the percent of grade. All necessary drains or roadway or subsurface water, which is otherwise not taken care of, shall be drawn in a manner approved by the Planning Board. The applicable design criterion shall be no increase in the peak rate of runoff for the 10-year 24 hour storm, and the 100-year 24 hour storm shall be assessed to determine that there will be no adverse impact on the proposed subdivision or adjacent and downstream properties. Where water is to be ponded to a depth greater than two (2) feet, a four foot fence or barrier is to be used to limit access. A twelve (12) foot gate and road is to be included to allow access for maintenance.

No stormwater appurtenances that service the proposed subdivision will be located outside of the Subdivision boundaries.

Ownership and responsibility for maintenance of all drainage structures located outside of the right of way (e.g. detention/retention basins, headwalls, swales, etc.) shall become the responsibility of the property owners within the subdivision. Ownership and responsibility for maintenance of those structures shall be deeded to a Homeowner’s Association as defined in Section V. H. The town of West Boylston will not accept ownership nor responsibility for maintenance of said structures.

The use of Low Impact Development methods is encouraged.

#### *F. PROTECTION OF LOCAL WATER SUPPLY*

All proposed storm water management systems must provide for maintaining existing storm flow rates from the site under the developed condition. In addition, no direct discharges of stormwater to wetland resource areas or waterways will be permitted without treatment prior to discharge. Stormwater systems should be designed to reduce suspended solids by a minimum of 80% to prevent pollution from reaching off-site areas and degrading water quality. To achieve these reductions in pollutant loads the Stormwater Best Management Practices (BMP) adopted by the Department of Environmental Protection (DEP), including those cited in the DEP Stormwater Management Policy Guidance (1996), shall be followed for all developments. The use of Low Impact Development (LID) practices is encouraged. Additional information regarding LID is available on the Massachusetts State Website. Other sources of BMP and techniques are detailed in the USEPA Guidance for Construction Site

Stormwater Management (1992) and the Massachusetts Nonpoint Source Management Manual (1993) as amended.

G. *SEWERS*

1. Proposed sewer systems must comply with the Town of West Boylston Sewer Use Regulations. Proposed sewer systems must also comply with TR-16 (Guides for the Design of Wastewater, from the New England Interstate Water Pollution Control Commission) and all current Policies on sewer construction as adopted by the Board of Sewer Commissioners. Said Regulations and Policies are available at the office of the Department of Public Works.
2. Inspection and approval of the sewers will be done by the Department of Public Works.
3. Sanitary sewers shall be constructed as shown on the Sewer Master Plan. Pipe sizes, materials, grades and locations shall be shown on the plan. All construction shall be in accordance with the specifications of the Board of Sewer Commissioners.
4. House connection to have a slope of 2% minimum.
5. Manholes shall be constructed at all changes in slope, direction or pipe size, and shall not be greater than 300 feet apart.
6. Prior to approval of the system, air, vacuum and manhole testing will be required, at the Applicant's expense, as directed by the Department of Public Works.. All pipe installation will be inspected prior to backfill. An As-built drawing, certified by a Professional Engineer, will be provided prior to acceptance.
7. All pipe is to be PVC or Ductile Iron. All manholes are to be precast concrete with brick inverts.
8. The sewer shall be located in the center of the road.
9. Infiltration allowance for the sewerage system shall be a maximum of 200 gallons per day per mile of sewer per inch of pipe diameter, as determined by a standard infiltration test if required by the Department of Public Works. In the case of an exfiltration test, the minimum allowable value shall be 295 gallons per day per mile of sewer per inch of pipe diameter.
10. Dry sewers shall be planned and installed in a subdivision when required by the Planning Board and the Board of Sewer Commissioners.

*Rules and Regulations Governing the Subdivision of Land in West Boylston, MA*  
**SECTION VI: DESIGN STANDARDS**

11. Pipe sizes and location shall be designed in accordance with standard engineering practice such as the American Society of Civil Engineers Manual of Practice No. 37 as approved by the Planning Board and the Department of Public Works . Minimum pipe size allowable shall be 8 inches for lateral and 6 inches for a service.
12. The minimum allowable slopes for sanitary sewers shall be as follows:

<b>Pipe Size in Inches</b>	<b>Minimum Slope Feet per Foot</b>
8	0.004*
10	0.003
12	0.002
15	0.0015
18	0.0012
21	0.0009
24	0.0008
27	0.0007
30	0.0006
36	0.0005

\*The Planning Board may require a minimum slope of .01 for upstream sections of PVC sewer lines.

13. When sewers are increased in size, or when a smaller sewer joins a larger one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. An approximate method for securing these results is to place the 0.8 depth point of both sewers at the same elevations.
14. Sewers must be laid with uniform slope and alignment between manholes.
15. In the case of sewers where the slope and volume are such that velocities of 15 feet per second are realized at average flow, special provisions shall be made to protect against erosion and shock.
16. A drop pipe should be provided for a sewer entering a manhole at an elevation above the manhole invert .

*H. EASEMENTS*

1. Easements for utilities within lots or along rear or side lot lines, shall be provided where necessary, and shall be at least 20 feet wide and accessible by maintenance vehicles.
2. Where a subdivision is traversed by a water course, drainage way, channel or stream, the Planning Board shall require the Applicant to provide a stormwater easement or drainage right-of-way of adequate width to conform substantially to the lines of such water course, drainage way, channel or stream, and to provide for construction, maintenance or other necessary purposes. In the absence of engineering or physical evidence as to the extent of the drainage way, an easement shall be required encompassing 30 feet from the banks of any perennial stream and 15 feet from the bank of an intermittent stream.
3. In order to secure adequate provision for water, sewerage, drainage, and other requirements where necessary in the subdivision, all water courses, drainage ways, channels, and streams shall be unobstructed and free from debris.
4. Easements for drainage across lots, usually along rear or side lot lines, shall be provided where necessary, and shall be at least 20 feet wide. Such easements shall be of adequate width to provide for the construction of such drainage and for the proper maintenance thereof.
5. All lines of all easements will be calculated and described on the subdivision plan with a bearing and a distance.
6. If on the Preliminary or Definitive Plan an area is left for possible future construction of a road to back or adjacent land, a minimum of a 10-foot wide slope easement shall be shown on all lots abutting such road area to enable proper slope construction if and when the road is built. The slope easements shall accompany the easement for future roadway and utility construction of the road area.
7. Temporary construction easements shall be shown on all lots adjacent to the proposed roadways to allow for construction of backslopes from the road onto the lots. The easements shall extend a minimum of 10 feet into each lot, or a greater distance if required by the proposed construction. The easements shall terminate upon acceptance of the street by the town.

*I. OPEN SPACES*

Before approval of a Preliminary or Definitive Plan, the Planning Board shall, in proper cases, require the plan to show a park or parks suitably located for playground or recreation



*SECTION VI: DESIGN STANDARDS*

purposes or for providing light and air. The park or parks shall not be unreasonable in area in relation to the area of the property proposed to be subdivided and to the prospective uses of such property.

Such parks shall be provided with appropriate frontage on a street and pedestrian ways from each of the surrounding streets. The Planning Board may, by appropriate endorsement on the plan, require that no building be erected within the boundaries of such park or parks for up to 3 years without its approval.

*J. PROTECTION OF NATURAL FEATURES*

1. Due regard shall be shown for all natural features, such as large trees, archaeological sites, water courses, historic sites, scenic points, and similar community assets, which, if preserved, will add attractiveness and value to the subdivision.
2. Every subdivision shall comply with the requirements of the *Wetlands Protection Act, M.G.L. c.131, §40*, the regulation issued thereunder. If design changes are required as the result of an action or decision of the Conservation Commission pursuant to such provisions, the Applicant shall promptly notify the Planning Board. The Planning Board may condition its approval of the plan upon the issuance of an Order of Conditions by the Conservation Commission.
3. The Tree Warden shall be consulted before any trees are removed.

*K. EARTH REMOVAL*

Where earth removal is associated with the construction of subdivision streets and drainage, the developer shall provide the following information in accordance with the requirements of the Earth Removal Board:

1. Amount of earth to be removed; and
2. Proposed disposition of such earth.

*L. EROSION AND SEDIMENT CONTROL*

1. The purpose of this section of these Rules and Regulations is to eliminate or reduce the harmful impacts of soil erosion and sedimentation on the public health, safety and welfare and the environment by prohibiting increases in sediment-laden runoff from land-disturbing activities and by prohibiting streambank erosion along bodies of water. This section sets forth activities with potential for such impacts and requiring review and approval as part of the Subdivision Control process for activities above thresholds of jurisdiction under this section. By implementing the controls in this

*SECTION VI: DESIGN STANDARDS*

section such erosion and sediment will be controlled to protect water quality, flood storage, stream flow, wildlife habitat, aquatic resources and public safety.

2. No person shall clear, cut, or do any land-disturbing activity on an area of land pursuant to a Definitive Plan approval pursuant to these Rules and Regulations unless such land disturbance has been specifically approved by the Planning Board put to this Section. In order to obtain such approval, the Applicant shall submit, together with the Definitive Plan:
  - a. A description, phasing, and sequencing of construction activities, which specifies the expected date of soil stabilization and completion;
  - b. Temporary and permanent soil erosion and sediment control measures;
  - c. Temporary and permanent seeding and other vegetative controls.
  
3. The Applicant shall have a Certified Professional in Erosion and Sediment Control or Registered Engineer prepare detailed erosion and sediment control plans for approval by the Planning Board, which may include:
  - a. Detailed location, elevation, and cross-section of any dam or basin with drainage calculations to justify basin sizing;
  - b. Plan view of any dam or basin;
  - c. Spillway and outlet control designs showing calculations and profiles;
  - d. Emergency spillway and outlet control designs showing calculations, profiles, and cross-sections;
  - e. Runoff calculations for peak runoff during a 100-year storm;
  - f. Notes and construction specifications;
  - g. Type of device;
  - h. Drainage area to any device;
  - i. Volume of storage required;
  - j. Outlet control mechanism details;
  - k. Storage depth below an outlet or clean-out elevation;
  - l. Embankment height, slope, cross-sections, and elevation;

- m. If required by the Planning Board, a portable safety fence may be required surrounding any basin or trap, not less than 42 inches in height with openings not more than three inches in diameter, firmly anchored at spacing no greater than eight feet. Detailed plans should be submitted where appropriate.
- 4. Vegetative stabilization measures will be employed. All perimeter dikes, slopes, basin or trap embankments will be stabilized with sod, hydroseed, and/or straw mulch (anchored on disturbed slopes greater than 15%), within 7 calendar days of disturbance. All other disturbed areas will be stabilized with sod, hydroseed, and/or straw mulch, (anchored on slopes greater than 15%), within 14 calendar days after disturbing activities have ceased.

The applicant shall submit a plan depicting where topsoil will be stripped from areas to be disturbed and stockpiled in an approved area and stabilized with temporary vegetative cover if left more than 21 calendar days. Perimeter sediment controls will be installed around stockpiled topsoil.

During the months of October through March, when seeding and sodding may be impractical, an anchored mulch will be applied as approved by the Board.

- 5. During construction, all catch basins shall be provided with siltation controls and maintained to minimize the amount of silt that enters the drainage system.

## **SECTION VII      IMPROVEMENTS**

The Applicant shall arrange, perform or contract and pay for all services and material needed for the installation of municipal services, including storm drains, sewerage, street lighting, water supply and fire alarm and their appurtenances and for the construction of streets, including roadbed preparation, pavement, driveway aprons, sidewalks, grass plots, curbing, non-regulating street signs, bounds, fences and guard rails, retaining walls, and erosion and sedimentation control devices and roadside improvement such as slopes and trees. All of these required improvements shall be installed or constructed in accordance with applicable provisions of these Rules and Regulations and as shown on approved definitive plans or as specified in the certificate of Planning Board's approval or in any covenants and agreements executed by the applicant and accepted or approved by the Board. Once municipal services are installed, the Applicant is responsible for operation and maintenance costs of these services until the road is accepted by the Town.

Construction activities are to occur only during the hours of 7 am through 7 pm, Monday through Saturday.

### *A.      STREETS AND ROADWAYS*

1.      The entire area of each street or way shall first be cleared of all stumps, brush, roots, boulders, like material and all trees not intended for preservation. Stumps and trees not intended for preservation shall be cleared and shall not be buried. All loam and other yielding material shall be removed from the roadway area to the depth encountered and for the full width of the traveled way. Rock and boulders shall be taken away or broken off to a depth of not less than 12" below the bottom of the sub grade. All drains, public utilities and water mains including individual service laterals shall be installed prior to any further construction of the roadway.
2.      All roadways shall be constructed in accordance with the West Boylston Department of Public Works Standard Specifications and shall be brought to a finished grade as shown on the profiles of the Definitive Plan and in accordance with the cross section adopted by the Planning Board, constructed as follows: At least 18 inches of good, clean bank gravel with no stones larger than 4 inches in diameter shall be in place and compacted. The surface shall be wet during compaction to bond the material. Thereafter the roadway shall receive a layer of select gravel of at least 4 inches in thickness, free of all stone over 1-1/2 inches in diameter and free from loam or other foreign material. This layer shall also be wet and compacted. All layers shall be compacted to not less than 95% of the maximum dry density of the material as determined by the standard AASHTO Test Designation T99 compaction test method C at optimum moisture content. All tests are at the applicant's expense.
3.      After the roadway has been finished with the top gravel coat and inspected it shall receive the following surface treatment: The roadway shall be paved to a thickness of 3

*SECTION VII: IMPROVEMENTS*

inches measured after compaction with 2 courses of Class One Bituminous concrete pavement, Type I-I consisting of a 1-inch wearing course and 2-inch binder course. The aggregate shall be composed, mixed and laid hot in two courses as specified in the "Massachusetts Public Works Specifications, Section 460 for Class I Bituminous Concrete Pavement" as specifically set forth in Section 460.20 to 460.82 or as amended.

4. After road acceptance there shall be no street cuts for five years except in the case of, in the opinion of the Planning Board and the Director of the Department of Public Works, an emergency.

*B. MUNICIPAL AND UTILITY SERVICES*

1. All utilities within a subdivision shall be placed underground. Adequate provisions for street lighting shall be made where underground electrical service is provided.
2. Drains, sewer pipes and related equipment, such as manholes and catch basins, shall be constructed in conformity with specifications of the "Standards Specifications for Highways and Bridges," Department of Public Works, Commonwealth of Massachusetts, 1988, as amended.
3. Water pipes and related facilities such as hydrants, blow-offs and shut-off valves shall be installed within the subdivision as necessary, providing all lots on each street with adequate water supply for domestic and fire protection use. Hydrants shall be not farther than 500 feet apart. The cost for materials, labor and installation shall be borne by the Applicant. Materials and supplies used in such installation shall conform to West Boylston Water District specifications. Water mains shall be no less than 8 inches in diameter and shall be of larger size when required by the Board. All water pipe and facilities required by the Town's Consultant Engineer, including thrust blocks and curb stops shall be constructed prior to the finish grading of the roadway.
4. Adequate disposal of surface water shall be provided in the following manner:
  - a. Each drainage plan submitted for approval shall be accompanied by a design analysis prepared by a qualified Registered Professional Engineer. The analysis shall clearly indicate all the computations for the drain including determination of pipe size and strength, channel size and stability, and a statement concerning the disposition of flow. If the flow is discharged to the ground surface on land not belonging to the applicant then a drainage easement over the ground subject to flow shall be obtained by the applicant, and a statement to that effect shall be included with the design analysis.
  - b. The rational method shall be used with a rainfall event having a recurrence interval of 10 years for design computations for drain lines. This storm has an

intensity of 5.4 inches for a 5 minute time of concentration. Intensities for small areas correspond to the time of concentration for the area. A rainfall event having a recurrence interval of 50 years shall be used for roadway culvert design.

- c. The curve number or "C-value" used to calculate 'existing conditions' flows shall be based on a wooded or grassed land use and the appropriate hydrologic soil group. Runoff analysis shall be based on NRCS(SCS) methodology presented in TR-55 or TR-20. Pre- and post-development runoff for 2, 10 and 100 year-24 hour, Type III storm events shall be compared.
- d. The proper drain size may be calculated by using "Manning's Formula" with a "Kutter's" "n" value of 0.010 for smooth plastic pipe, 0.013 for concrete pipe, and 0.024 for corrugated metal pipe. For culverts, the minimum size of pipe shall be 12 inches in diameter. The culverts and drains shall be large enough to pass the design storm without surcharge.
- e. All storm drains shall be High Density Polyethylene (HDPE-N12) or reinforced concrete of adequate strength, except that, if approved by the Planning Board, bituminous coated, galvanized, corrugated metal pipe or pipe arch or other material may be used in off-street locations. Piping shall be in conformance to the State of Massachusetts Standard Specifications for Highways and Bridges, as amended.
- f. All storm drain pipes shall be laid on a slope so that the minimum design velocity shall be 3.0 feet per second. Consideration will be given to flatter slopes if adequate provisions are made for cleaning the pipes. All plans having drains with slopes which will produce pipe velocities less than 2.0 feet per second, flowing full, shall be accompanied by a letter stating the reason for the flat slope. The letter shall have a space for approval by the Planning Board or its Agent or Consultant Engineer, and the drain shall not be constructed until the letter has been approved. The maximum allowable velocity with the pipe flowing full shall be 15 feet per second.
- g. Inlets shall have an adequate waterway opening to pass the design storm with not more than 0.2 feet of surcharge. Grates and frames shall be "American made," of cast iron suitable for the loads which can occur either during the construction or afterward. Inlets shall be constructed either of brick and mortar with 8" thick walls, precast segmental concrete blocks not less than 6" thick mortared in place, or of precast pipe sections. Inlets shall be set on a base of either poured concrete 8" in thickness, or precast segmental base blocks not less than 4 inches in thickness. Inlets shall be used in off-street locations and the grate frame shall be mortared in position with the rim 0.2 feet below the grade of the finished ground surface. Side openings may be used in lieu of a grate if

the quantity of runoff exceeds the capacity of a grate of reasonable size as approved by the Planning Board or its Agent or Consultant Engineer. Inlets shall be 5.0 feet inside diameter, with a 4' sump and watertight hood or "T" over the outlet, and discharge to a manhole.

- h. Catch basins shall be installed on both sides of the roadway on continuous grades at intervals not to exceed 250 feet, at low points and sags in the roadway, near the corners of the roadway at intersecting streets. Such catch basins shall have a five foot inside diameter with a four foot sump and a watertight hood, and shall be provided with curb inlets. Drain pipes shall extend through manholes to the point of discharge, with a manhole being required at every change in direction, slope or diameter in the drain pipe, and at every intersection of drain pipes (see Plates 2 and 2A). All catch basins shall discharge into the drain system through a manhole.
- i. The pipe trench shall be excavated to the required line and grade shown on the approved plan including earth, boulders and ledge. Trenches for storm drains shall be no wider than the outside diameter of the pipe plus 16 inches for pipes through 18 inches nominal diameter, and the outside diameter plus 24 inches for pipe larger than 18 inches. This trench width shall apply from the top of the pipe to the bottom of the trench. Above the top of the pipe the trench may be as wide as necessary to properly install the pipe. Trenches with side slopes steeper than the natural angle of repose of the soil shall be sheeted as necessary to avoid cave-ins and sloughing.

All excavations shall be properly barricaded and lighted at night where they are close to pedestrian or vehicular traffic. Before any pipe is placed in newly constructed fill, the Contractor shall, as directed, place the fill 2 feet above the top of the pipe after which the pipe trench may be excavated. If any cross pipes, conduits, drains or other unforeseen obstacles are encountered in the excavation which cannot be relocated, the drain shall be redesigned to avoid the obstruction in a manner suitable to the Planning Board or its Agent or Consultant Engineer. Possible obstructions to the line shall be investigated prior to the construction of the drain in its immediate vicinity.

- j. Trenches may be excavated with a flat bottom, but the full length of the pipe, except the bell, must rest upon undisturbed soil except as hereinafter specified. Where trenches have been over-excavated, a selected earth or gravel foundation, thoroughly compacted, shall be provided for proper pipe bedding. Soil, which is considered to be unstable by the Planning Board or its Agent or Consultant Engineer, shall be removed to a depth of not less than 2 feet below the bottom of the pipe and replaced with compacted sand and gravel to the bottom of the pipe. Unstable soil or other excavated material shall be disposed

of off site. When PVC or HDPE pipe is used, bedding and backfill shall be brought to the springline of the pipe.

- k. Pipe shall be laid starting with the downstream end. Grade boards or other approved devices shall be provided to insure that the pipe is laid true to line and grade. Reference bench marks shall be clearly marked to enable the Inspector to quickly check the grade and invert elevations. The joints of all pipes shall be filled with mortar composed of one part Portland Cement to three parts clean sharp sand. Jute shall be required on joints of all pipes 15 inches or larger. Lime may be added up to 25 percent of the cement and enough water to make a workable mix. The downstream pipe shall be laid with groove or bell end facing upstream in the proper position, and a dab of mortar shall be placed in the bell or groove. The spigot or tongue end shall be placed in the bell or groove, such that the inverts match and, the peripheral space shall be filled with stiff mortar. All mortar squeezed out on the inside of the pipe shall be removed before it sets.
- l. After the pipe has been laid and inspected, the trench shall be backfilled. The space under the pipe haunches shall be carefully filled with selected material, free from stones or frozen earth, and compacted carefully to prevent the pipe from moving. The layer of backfill up to 12 inches over the top of the pipe shall also be of select material free from stones and frozen earth, and compacted. The remainder of the trench shall be backfilled in 12 inch layers except as noted below, and each layer shall be fully compacted in an approved manner. Under roads or other traffic areas the trench shall be backfilled in 6 inch layers with each layer compacted to the density of the surrounding soil. Pavement and base course materials removed during the excavation process shall be replaced with pavement and base course to match those removed. No old pavement shall be backfilled into trenches. When, in the opinion of the Planning Board or its Agent or Consultant Engineer, the excavation is deep enough to warrant it, temporary pavement shall be provided as directed. Trenches not in pavement shall be left in mounded condition as directed by the Planning Board or its Agent or Consultant Engineer.
- m. Security bars shall be provided at the entrance and outfall of all culverts or open pipe drains greater than 12" diameter. Bars shall be constructed such that it will not pass an 8" diameter sphere or become easily clogged, or of a design approved by the Planning Board or its Agent or Consultant Engineer, and the grate shall be installed in a manner approved by the Planning Board or its Agent or Consultant Engineer. A suitable drawing of the grate and method of installation shall be submitted for approval with the plans for the drains and appurtenances.



SECTION VII: IMPROVEMENTS

- n. Concrete or Field Stone masonry headwalls shall be provided at both ends of culverts and the discharge ends of storm drains. They shall conform to the table on Plate 3 and 3A.
- o. The discharge ends of all drains with flowing full velocities of 4 feet per second or more shall be protected with bank/apron protection of a width not less than 10 times the nominal pipe diameter from the end of the discharge pipe. The bank/apron protection for exit velocities of 4 to 10 feet per second shall be composed of a minimum of a 12 inch thick layer of stones placed upon a bed of sand and gravel 6 inches in thickness, or an appropriate geotextile membrane: The stones shall be sized so that not less than 60 percent shall have a dimension of 12 inches or more. The stones after being laid shall be carefully chinked by hand to make a reasonably smooth and shaped surface. Where exit velocities are greater than 10 feet per second, the thickness of stones and the dimensions of the individual pieces shall be sized to prevent displacement by the flow. In this case, details shall be submitted to the Planning Board or its Agent or Consultant Engineer for approval. In addition, bank/apron protection will be required for all drainage channels having design flow velocities greater than five (5) feet per second and for any change in direction or intersection of drainage channels. Methods other than using stone are encouraged, and specifications and details need to be submitted.

C. SIDEWALKS AND BIKEWAYS

- 1. All sidewalks shall be designed in conformance with conditions specified by the Architectural Access Board and the *Americans with Disabilities Act of 1990, 42 U.S.C. §1201 et seq.* All sidewalks will have a 5-foot minimum width.
- 2. Sidewalks and bikeways shall be in accordance with the specification below:
  - a. Concrete sidewalks: 4" thick cement concrete, reinforced with No. 4, 4" x 4" mesh, 2,500 lb. concrete, wood float finished, laid on a base of at least 6" of well compacted bank gravel. An expansion joint (3/4" open) shall be provided at least every 20' dividing joints shall be scored into walk every 4'. Base gravel material shall be in accordance with the specifications outlined above for street construction, provided that no stone shall have a dimension in excess of 2 ". It shall be thoroughly compacted.
  - b. Asphaltic concrete sidewalks and bikeways: The foundation shall be 6" of bank gravel as specified in Section (a) above. The wearing surface shall be laid in two courses, a 1" bottom course and a 1" top course, the thickness to be measured after compaction. The material and application shall conform to the

specifications for roadway surfacing. All edges of the walks shall be formed with wood screeds which are securely anchored and left in place.

- c. Use of permeable pavement, as approved by the Planning Board, shall be designed in accordance with the Massachusetts Stormwater Technical Handbook (as amended) or equivalent design guidelines and specifications approved by the Planning Board. Runoff shall be directed away from permeable paving surfaces as the introduction of dirt or sand onto the permeable paving surface when transported by runoff from elsewhere will contribute to premature clogging and failure of the paving. Permeable paving should be one of the last items to be constructed on a development site, after most heavy construction vehicles are finished and after the majority of the landscaping work is completed. Permeable pavement shall not be used on slopes steeper than 5%. Permeable pavements are not appropriate for gas stations, truck stops, or areas in which high concentrations of hydrocarbons or other pollutants can be leached into soil.
3. The following design guidelines shall be observed during the construction of bikeways:
    - a. Minimum pavement width: 8 feet;
    - b. Maximum grade: 8%;
    - c. Minimum center line radius: 25 feet;
    - d. Vertical curves shall be required for changes in grade which exceed 2%;
    - e. Curb cuts shall be provided at the intersection of bikeways and streets.
    - f. Signs of a design approved by the Board shall clearly mark each "Bikeway."

#### *D. CURBS*

1. Curbing is required on both sides of all roadways with piped drainage systems and shall be one of the types specified by the Planning Board except that type VA4 granite curb shall be used in the following cases:
  - a. All finished grades over 6%.
  - b. All headers with transition section at each end for catch basins.
  - c. All street intersections along turning radii and extending 6 feet tangent along each side of each roadway at the intersection.

2. Approved types of Curbing:
  - a. Sloped granite edge stone type SB.
  - b. Granite curbing type VA4.
  - c. Bituminous concrete berm "Modified Cape Cod Berm".
3. Terminal Curb: tapered terminal curb section of vertical granite curb construction having a minimum length of 4 feet and a tapered section 2 feet in length will be required as the first and last stones along each section of granite curbing and adjacent to each separately placed curb inlet.

*E. SIDE SLOPES AND PLANTINGS*

1. The area in back of the sidewalk shall be sloped at the rate of three to one (maximum) to a point where it precisely coincides with the finished grade of abutting lots.
2. On all areas within roadway, walkway, and bikeway right of-ways except areas not receiving surface treatment or areas requested by the Board to be left in a "natural condition" the ground shall be cleared and grubbed and at least 6 inches of an approved loam topsoil shall be applied. These areas shall be protected from erosion and seeded with an acceptable uniform, and healthy growth and until building construction has been completed.
3. No removal of loam from the development shall be made until a 6 inch thickness of loam shall be provided throughout the entire area of all lots and on the planting strips along the roadway. Only such areas as roadways, driveways, building sites and areas requiring filling may be stripped of topsoil. Areas on a lot where cut or fill is not required for construction of the buildings on that lot shall not be stripped of topsoil. Only after the above requirements have been met may surplus loam be disposed of in accordance with the Earth Removal Bylaw of the Town.

*F. STREET LIGHTS AND SIGNS*

1. The Applicant shall be responsible for furnishing and erecting street lights at locations and the type approved by the Planning Board and the West Boylston Municipal Lighting Plant. Lights shall be partial- or full-cutoff style with low-glare luminaires.
2. Street signs shall be erected at all intersections. These signs shall meet the specifications established by the Board of Selectmen, and shall be erected prior to the construction of the first building on the street. From the time of rough grading until

*SECTION VII: IMPROVEMENTS*

such time as each street is accepted by the Town as a public way, the sign posts at the intersection of such street with any other street shall have affixed thereto a sign designating such street as a private way. The lettering shall be so arranged that the word "Private" may be painted out or removed when the street is accepted by the Town as a public way. Street sign posts shall be seated on concrete.

3. Street names shall be approved by the Planning Board. The applicant shall contact the Historic Commission for recommendations.

*G. TREES*

1. The Applicant shall provide and plant at approximately 75-foot intervals and ten (10) feet off the right of way at least one suitable shade tree, having a minimum height of 10 feet. Both the species and the location of which trees are to be planted shall be approved by the West Boylston Tree Warden. Existing trees of at least equal size that have been preserved within the right-of-way may be substituted to fulfill this requirement.
2. If the Applicant finds it necessary to remove any tree owned by the Town, or if the Planning Board finds it necessary to have the Applicant remove any such trees, the Applicant may do so with the approval of the Tree Warden, and shall replace any and all at his own expense with new plantings of a size and species approved by the Tree Warden. The locations for these plantings shall be designated by the Tree Warden, and shall be guaranteed by the Applicant for a period of one year.

*H. MONUMENTS*

1. Monuments shall be made of granite and installed at all way intersections, at all points of change in direction or curvature of ways and at other points where, in the opinion of the Planning Board, permanent monuments are necessary. Concrete monuments shall be installed at all points of change in direction or end points of easements. All monuments shall be a minimum of 4 inches square by 4 feet long and shall be set 4 inches above the proposed grade. No permanent monuments shall be installed until all construction which could destroy or disturb the monuments is completed.
2. The Planning Board shall require a certificate by a registered land surveyor to be obtained at the Applicant's expense, indicating that these monuments are in place and accurately located. The certificate is to be presented to the Consultant Engineer prior to acceptance of the road by the Town.

*I. DRIVEWAYS*

Driveways shall be installed in conformity with the Town of West Boylston Driveway Location Rules and Regulations, dated February 1, 2004, or as amended, and compliant with the design specifications on the Typical Driveway Detail. A Street Access Permit shall be required from the Department of Public Works for all driveways.

*J. CLEAN UP*

The entire area must be kept clean during construction and cleaned up so as to leave a neat and orderly appearance free from debris and other objectionable material.

## SECTION VIII ADMINISTRATION

### A. WAIVER OF COMPLIANCE

Strict compliance with the requirements of these rules and regulations may be waived when, in the judgment of the Planning Board, such action is in the public interest and not inconsistent with the intent of the *Subdivision Control Law*. In making this determination, the Planning Board shall consider whether:

1. The public health, safety, and the environment will be protected;
2. Strict application of the requirement to be waived would undermine the public interest;
3. Specific substitute requirements can be adopted that will result in the substantial protection of the Subdivision Control process established in *M.G.L. c.41 §81R*, and the rights of persons affected by the waiver; and
4. The action made possible by the waiver will not violate the provisions of any state or federal law or local bylaw.

The Planning Board may not waive the requirements of the Zoning Bylaws of the Town of West Boylston.

### B. CONSULTANT COSTS

1. In any matter under the Planning Board's review where the Board determines that the assistance of outside consultants (engineers, lawyers or other appropriate professionals) is warranted due to the size, scale, or complexity of a proposed project or because of a project's potential impacts, the Board shall require that applicants pay a "review fee" and a "construction inspection fee" consisting of the reasonable costs incurred by the Board for the employment of outside consultants engaged by the Board in the review of an application and to ensure compliance with Planning Board decisions.

*SECTION VIII: ADMINISTRATION*

2. A deposit towards said "review fee" and "construction inspection fee" shall be made at the time the application is submitted (see Fee Schedule). Amendments to an approved subdivision plan must also be accompanied by the appropriate fees (see Fee Schedule). Any application not accompanied by the appropriate fee, payable to the Town of West Boylston, in cash, money order, bank or certified check, shall be deemed incomplete. An Applicant's failure to pay any additional review or inspection fee within three business days of receiving notice that further fees are required shall be grounds for either disapproval or rescission of a decision of the Planning Board.
3. Funds received by the Board pursuant to this section shall be deposited with the municipal treasurer who shall, pursuant to *M.G.L. c.44, §53G*, establish a special account for this purpose. Expenditures from this special account may be made at the direction of the Board without further appropriation by Town Meeting. Expenditures from this special account shall be made only in connection with the review of a specific project or projects for which a review fee has been or will be collected from the Applicant. Failure of an Applicant to pay all appropriate review fees shall be grounds for denial of the application.
4. Review fees may only be spent for services rendered in connection with the specific project for which they were collected. Accrued interest may also be spent for this purpose. At the completion of the Board's review of a project, any excess amount in the 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, provided that any person or entity claiming to be an Applicant's successor in interest shall provide the Board with documentation establishing such succession in interest.
5. Pursuant to *M.G.L. c.44, §53G*, any Applicant may take an administrative appeal from the selection of the outside consultant to the Board of Selectmen. The grounds for such an appeal shall be limited to claims that the consultant selected has a conflict of interest or does not possess the minimum required qualifications. The minimum qualifications shall consist of either an educational degree in or related to the field at issue or three or more years of practical experience in the field at issue or a related field. The required time limit for action upon an application by the Board shall be extended by the duration of the administrative appeal. In the event that no decision is made by the Board of Selectmen within one month following the filing of the appeal, the selection made by the Board shall stand.

*C. MODIFICATION, AMENDMENT OR REVISION OF DEFINITIVE PLAN APPROVAL*

The Planning Board on its own motion or on the petition of any interested person shall have the power to modify, amend, or rescind its approval of a Definitive Plan of a subdivision, or to require a change in a Plan as a condition of its retaining the status of an approved plan after

due notice and opportunity to the Applicant to be heard in accordance with *M.G.L. c.41, §81W*.

*D. SUPERVISION AND INSPECTION*

1. All work performed as pursuant to these Rules and Regulations shall be subject to review of the Planning Board, which shall approve and accept, or disapprove and reject, each phase or portion of such work. The Planning Board may employ a registered professional engineer or other qualified agent to act to inspect the work to ensure that it is performed in accordance with good engineering practice and with all applicable specifications, to ensure compliance with these Rules and Regulations, and to report to the Board any recommendations as to approval or disapproval of the work. Such agent will make certain inspections as prescribed in this subsection in order to check the adequacy of the work at various stages prior to such work being covered by subsequent work. However, the Planning Board, its Agent or Consultant Engineer shall also have the right to inspect work at any time.
2. After approval of the Definitive Plan, the Board will notify the Applicant of the name and address of the Planning Board Agent or Consultant Engineer designated as its representative to perform inspections, as required herein and otherwise, as the Board's agent to ensure compliance with these Rules and Regulations. The Applicant shall keep the Planning Board and its Agent or Consultant Engineer fully informed as to the status and progress of the work.
3. The Applicant shall provide safe and convenient access to all parts of the subdivision for the purposes of inspection to representatives of the Planning Board or other Town agencies or boards or the Planning Board Agent or Consultant Engineer. No work will be accepted that has been covered before such inspection. The Applicant shall notify the engineer directly (by mail or in person by telephone) and shall thereafter file a written statement with the Planning Board including the date and time of such notification and the person notified at least 48 hours in advance that the work has progressed to a stage that an inspection is required. The Planning Board Agent or Consultant Engineer will inspect the work in progress during reasonable hours, as the Construction Inspector will see fit; but in any case, it will be the Applicant's responsibility to request his inspection at the following progress steps:
  - a. After excavation and/or filling has been completed, but before the gravel placement operation is started. The purpose of this inspection is to ensure that the correct materials have been used and ensure that the site has been prepared in a proper manner;
  - b. After the drainage system (pipe, manholes, catch basins and other drainage structures) is installed, but before it is covered. The inspector shall enter each



catch basin to sight drainage pipe runs to adjacent basins. Any defective runs shall be corrected before approval is given. The purpose of this inspection is to ensure that the lines have been installed correctly;

- c. After surface gravel is in and compacted, but before bituminous surface treatment is applied. The inspector shall also inspect pipe runs from catch basins, as above; field tests and observation will be conducted to ensure correct placement of fill and compaction;
- d. After bituminous concrete and curbing, if required, are installed, to ensure correct construction of pavement, curb, and sidewalk including in-place thickness measurements, temperature measurements at the time of placement, and density test after rolling; and
- e. Before acceptance by the Town of West Boylston to ensure the installation of grass plots, street signs, monuments and of cleaning up.

The Director of the Department of Public Works may inspect the work at his discretion, reporting any deficiencies to the Planning Board or the Consultant Engineer retained by the Planning Board.

The Applicant must furnish all data relative to baselines and grade stakes on the ground, stake sheets, ties and any other information that is needed in the opinion of the Planning Board or those designated by the Planning Board to accomplish such checking as is required for the requested approval and certification.

- 4. Inspections of the water system, including the placement of hydrants, valves, etc. is normally carried out by the West Boylston Water District. Duplicate inspections by an inspector designated by the Planning Board will not normally be required.
- 5. The Department of Public Works or its agent will inspect the sewer system, including installation and testing of the mains and devices. Duplicate inspections by an inspector designated by the Planning Board will not normally be required.
- 6. In the event the Planning Board Agent or Consultant Engineer makes an inspection of the work at the time designated and finds that such work is not at the proper stage of completion, or that the work has been covered or otherwise obscured, the Planning Board Agent or Consultant Engineer shall notify the Applicant and the Planning Board as to the additional steps the applicant shall take to complete the work to the point required, or the extent to which the work shall be uncovered or exposed to a full view. The Applicant shall notify the Planning Board Agent or Consultant Engineer again as prescribed above in this section when the work is ready to be inspected.

*SECTION VIII: ADMINISTRATION*

7. All work which has been disapproved, or is not acceptable to the Planning Board, shall be removed and replaced or otherwise corrected to the point of complying with the requirements of the Planning Board for acceptance. Any work which has been covered by subsequent work prior to acceptance, or is otherwise not available or obscured to the point of rendering inspection of the work difficult, shall be considered to be not acceptable to the Planning Board. Due to failure to comply, failure to notify, or failure to be ready as scheduled shall be directly billable to the Applicant by the Planning Board.
8. The Planning Board Agent or Consultant Engineer shall not authorize any changes from the approved record plan for the subdivision without specific approval of the Planning Board except as follows:
  - a. The Planning Board Agent or Consultant Engineer may authorize field changes subject to review by the Planning Board at their next regular meeting. The Planning Board shall respond by approving or disapproving the change within 15 days of the meeting at which it is submitted. If the Planning Board does not approve, the original plan will remain in effect and the Applicant will be required to reconstruct in accordance with the original plan.
  - b. At the time the change is requested, a "red-lined" plan (2 copies) will be submitted to the Planning Board Agent or Consultant Engineer who will review the plan, stamp "subject to approval of the Planning Board" and sign if he approves the plan (or return it if he disapproves), submit it to the Planning Board for review and signature at their next scheduled meeting for approval, and filing.
  - c. When it is deemed necessary by the Planning Board, a properly revised plan showing the change may be required in addition to the "red-lined" plan.
  - d. At the time the change is reviewed by the Planning Board, it shall be accompanied by an explanation of the reason for the requested change.
9. If the applicant does not advise the Planning Board of the construction sequencing and proper inspection is not completed, additional testing and inspection will be required to prove compliance.

*E. ACCEPTANCE OF ROADS*

1. When a road or way in a subdivision has been completed in a manner fulfilling the requirements of the Planning Board, the Applicant may request the Planning Board to inspect the road or way in order to give a recommendation to Town Meeting, on whether the road or way should be accepted.

The Planning Board shall require the following information before making a recommendation to the Town Meeting:

- a. Two copies of a plan of the road or way "as built," at a scale of 40 feet (or other appropriate scale) to the inch at size 24" x 36". Said plan to show a center line profile (4 feet per inch on the vertical scale and 40 feet per inch on a horizontal scale) taken at 50 foot intervals along the road or way as it has been completed. All utilities, public and private, above and below grade shall be shown on the plan as they exist. Said As-Built Plans shall also be submitted digitally in AutoCAD©, Adobe Portable Document Format© or other such format acceptable to the Planning Board.
- b. One digital copy and two typewritten copies of the proposed article for the Town Meeting generally describing the locations and length of the road or way to be considered for acceptance by the Town.
- c. One digital copy and two typewritten copies of the description by metes and bounds of each road and easement considered for acceptance by the Town. After acceptance by the Town Meeting of a road or way in an approved subdivision, the "as built" plan referred to above, the vote of the Town Meeting, and the description of the road or way shall be recorded with the Worcester County Registry of Deeds by the Town Clerk.
- d. A release of liens under oath from all contractors and subcontractors approved for work on the road or way, attesting to the fact that all payments due them for labor and materials have been received, and that payments for all materials have been rendered.
- e. A typewritten plan for maintenance of the subdivision drainage system, right-of-ways, easements and roads for a 20-year period. The maintenance plan should include responsible parties and specific provisions for the maintenance of road pavement, soil settling problems, street sweeping, snowplowing, maintaining vegetative stabilization of all rights-of-way and easements, erosion controls, fall leaf cleanup, catch basins, detention basins, and drainage system cleaning and maintenance, and other provisions as determined to be necessary by the Planning Board. If the street is accepted by the Town, the town will not accept ownership of, or be responsible for maintenance of, any drainage beyond the road right of way, which shall be and remain in perpetuity the responsibility of the Homeowners Association and/or the lot owners.
- f. Draft Easement Deed(s) conveying to the Town a public way easement in the road and all associated drainage and other easements, generally in the form attached hereto as Section XIV. The grantor(s) must own the fee in the roadway.

In addition, the grantor(s) must own the fee to or have easement rights reserved in the areas to be subject to drainage and other easements.

- g. A draft title certification, prepared by an attorney licensed in Massachusetts, certifying that the grantors named in the Easement Deed are the holders of the fee to the roadway and have the fee to or easement rights in the property subject to the drainage and other easements, if any, that the easements conveyed to the Town are free of mortgages and liens and other encumbrances that would interfere with the exercise of the easements to be granted to the Town, and that the grantors have the right to grant the easements to the Town. A final title certification must certify the foregoing as of the date the easements are granted to the Town.

#### *F. RELEASE OF BONDS*

Before the Planning Board shall give final approval and release any covenants and/or bonds required for the construction of the improvements shown on the approved subdivision plan, the Applicant shall furnish the Planning Board, within five (5) years from the date of final approval of the Definitive Plan, final "as built" plans demonstrating compliance with the Record Plan for the subdivision.

1. No remaining portion of performance guarantee held pursuant to Section V.I of the Rules and Regulations shall be released until the Town has accepted the road or way as evidenced by an affirmative vote of Town Meeting.
2. Upon acceptance of a road by the Town, the following procedures shall govern:
  - a. Following an affirmative Town Meeting vote to accept a road or way, and an adjournment of said Town Meeting, the Town Clerk shall then notify the Town Treasurer and Director of the Department of Public Works in writing of such action.
  - b. Within 10 working days of receipt of such notification, the Treasurer shall release to the Applicant all but 10 percent of the performance guarantee provided for in Section V.I of these Rules and Regulations. In lieu of retaining the said 10 percent, the Treasurer may and is authorized to release the entire bond and accept in its place thereof, a bond or amount equivalent to 10 percent of the original performance bond amount so long as such substitute amount is in acceptable form as specified in Section V.I. The 10 percent retainage serves as security for a one-year warranty on defects in materials and/or workmanship in any and all of the improvements provided for pursuant to these Rules and

Regulations. For purposes of this provision, the one-year warranty period shall begin the date Town Meeting actually votes on the article accepting the roadway.

- c. No sooner than 30 days before the end of the one-year warranty period, the Applicant may petition the Planning Board for release of the 10 percent retainage. Upon certification of the Planning Board Agent or Consultant Engineer and Director of the Department of Public Works that there are no defects or repairs to be made, the Planning Board may notify the Town Treasurer that the remaining bond sum may be released within 10 working days of receipt of the notification or at the conclusion of the one-year period, whichever is later.
  
- d. In the event the Planning Board Agent or Consultant Engineer and Director of the Department of Public Works certifies that defects exist in the roadway or repairs are needed, the Planning Board shall adopt a schedule for the Applicant to make the necessary repairs. If such schedule has not been adhered to and completed, the Planning Board shall notify the Treasurer to capture said retainage for purposes of completing the work by the Town. Should such schedule be adhered to and all work is satisfactorily completed, the Planning Board shall, upon certification by the Planning Board Agent or Consultant Engineer and Director of the Department of Public Works, notify the Town Treasurer to return the ten percent (10%) retainage, which shall be done by the Treasurer within ten (10) working days of the receipt of said notification.

**SECTION IX        FEE SCHEDULE**

The Planning Board is authorized to establish a fee schedule following a public hearing for the performance of duties noted herein. A Fee Schedule has been established and is available at the Town Clerk's Office during business hours, and on-line at the Planning Boards web page

**SECTION X        FORMS**

All forms mentioned in this text may be obtained in the Planning Board office.

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**FORM A**  
**APPLICATION FOR ENDORSEMENT OF PLAN**  
**BELIEVED NOT TO REQUIRE APPROVAL**

File two completed forms with the West Boylston Planning Board  
and one with the West Boylston Town Clerk in accordance with  
the requirements of Section III.A.

West Boylston Planning Board

\_\_\_\_\_ date

To the Planning Board:

The undersigned wishes to record the accompanying plan and requests a determination and endorsement by the Planning Board that approval by it under the Subdivision Control Law, Chapter 41, is not required. The undersigned believes that such approval is not required for the following reasons: (Circle One)

1. The accompanying plan is not a subdivision because the plan does not show a division of land.
2. The division of the tract of land shown on the accompanying plan is not a subdivision because every lot shown on the plan has frontage of at least such distance as is presently required by the West Boylston Zoning Bylaw under Section 4.2 , and every lot shown on the plan has such frontage on:
  - a. a public way or way which the Town Clerk certifies is maintained and used as a public way, namely \_\_\_\_\_; or
  - b. a way shown on a plan theretofore approved and endorsed in accordance with the subdivision control law, namely \_\_\_\_\_ on \_\_\_\_\_, and subject to the following conditions \_\_\_\_\_; or
  - c. a private way in existence on October 5, 1954, the date when the subdivision control law became effective in the Town of West Boylston having, in the opinion of the Planning Board, sufficient width, suitable grades, and adequate construction to provide for the needs of vehicular traffic in relation to the proposed use of the land abutting thereon or served thereby, and for the installation of municipal services to serve such land and the buildings erected or to be erected thereon, with evidence of the existence of said private way prior to October 5, 1954 is attached.
3. The division of the tract of land shown on the accompanying plan is not a "subdivision" because it shows a proposed conveyance or other instrument which adds to or takes away from the size and shape of lots in such a manner so that no lot affected is left without adequate frontage, area or setbacks as required in the West Boylston Zoning Bylaws.
4. The division of the tract of land shown on the accompanying plan is not a subdivision because two or more buildings were standing on the plan prior to October 5, 1954, the date when the subdivision control law went into effect in the Town of West Boylston, and one of such buildings remains standing on each of



SECTION X: FORMS

the lots. Said buildings as shown and located on the accompanying plan, with evidence of the existence of said buildings prior to October 5, 1954 is attached.

OWNER'S NAME(S) - PLEASE PRINT

The owner's title to the land is recorded in the Worcester Registry of Deeds, Book \_\_\_\_\_, Page \_\_\_\_\_; or Land Court Certificate of Title No. \_\_\_\_\_, registered in \_\_\_\_\_, District Book \_\_\_\_\_, Page \_\_\_\_\_, and \_\_\_\_\_  
And is designated as West Boylston Assessors' Map \_\_\_\_\_, Parcel \_\_\_\_\_.

Received by Town Clerk:

Applicant's signature \_\_\_\_\_  
Applicant's Address \_\_\_\_\_

Date \_\_\_\_\_

Time \_\_\_\_\_

Signature \_\_\_\_\_

Signatures of All Owners of Record and addresses if not the Applicant; or Applicant's authorization if not the owner

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# ANR PLAN CHECKLIST

## FOR THE SUBMISSION OF PLANS WHICH THE APPLICANT BELIEVES DO NOT REQUIRE APPROVAL UNDER THE SUBDIVISION CONTROL LAW

This checklist is intended to supplement, not to supersede, the existing West Boylston Subdivision Regulations. Any inconsistency between the information on this list and those regulations should be resolved in favor of the regulations.

### 1. APPLICATION

A plan is properly submitted when the Planning Board receives, at one of its regularly scheduled meetings:

- Two properly completed Form A accompanied by the necessary evidence to show that the plan does not require approval (Consult Section III.A.1.a)
- One plan (see above for contents) printed on a mylar transparency sheet, and six (6) contact prints of the plan (Consult Section III.A.1.b)
- Filing fee (see Fee Schedule)

### 2. NOTICE TO THE TOWN CLERK

- Deliver by hand or send by certified mail written notice to the Town Clerk that the Plan has been submitted to the Planning Board (Consult Section III.A.2)

### 3. THE CONTENTS OF THE PLAN

- The plan, prepared in black ink upon mylar transparency sheets (Consult Section III.B)
- The proposed locus plan, north point, date, scale, legend, and the title "Plan of Land" (Consult Section III.B.1)
- The names and addresses of the record owner or owners of the property shown on the plan and the Applicant, if not the owner (Consult Section III.B.2)
- The date or dates of acquisition of the property (Consult Section III.B.2)
- All deed references (Consult Section III.B.2)
- The Town Assessor's sheet number and parcel number for the property (Consult Section III.B.2)

SECTION X: FORMS

- The name, signature and appropriate seal of the engineer or land surveyor who prepared the plan (Consult Section III.B.2)
- All property boundary lines adjacent to the proposed subdivision (Consult Section III.B.3)
- The zoning classification of the property, and the location of any zoning district boundary lines that lie in the vicinity of the property, including any variances, exceptions or other decisions issued for the property or for any existing or proposed building or structure thereon by the West Boylston Board of Appeals or a court of competent jurisdiction (Consult Section III.B.4)
- Proposed lot lines within the property shown on the plan, with approximate areas and dimensions, including frontage, of such lots, and a number on each lot, including the entirety of any lot proposing to have its boundaries changed (Consult Section III.B.5)
- The location of all existing structures, streets, ways, and easements on or abutting the land (Consult Section III.B.6)
- The statement "Planning Board Approval under the Subdivision Control Law Not Required" and sufficient space for the date and endorsement of the Planning Board, with the following statement immediately above or below such space:

**NO DETERMINATION AS TO COMPLIANCE WITH ZONING REQUIREMENTS HAS BEEN MADE OR INTENDED BY THE PLANNING BOARD'S ENDORSEMENT OF THIS PLAN.**

(Consult Section III.B.7)

**FORM B**  
**APPLICATION FOR DEFINITIVE SUBDIVISION**  
**PLAN APPROVAL**

File one completed form with the Planning Board, one with the Board of Health, and the original with the Town Clerk in accordance with the requirements of Section V.A. (Consult Section V.A)

To the Planning Board:

\_\_\_\_\_ date

The undersigned, herewith submits the accompanying Definitive Plan of the property located in the Town of West Boylston for approval as a subdivision under the requirements of the Subdivision Control Law and the Rules and Regulations Governing the Subdivision of Land in the Town of West Boylston. Eleven (11) sets of the Plans and three (3) sets of calculations for Drainage, or Traffic or Economic Impact (when required.) are enclosed herewith.

1. Name of Applicant \_\_\_\_\_  
Address \_\_\_\_\_
2. Name of Engineer and Surveyor \_\_\_\_\_  
Address \_\_\_\_\_
3. Deed of Property recorded in \_\_\_\_\_ Registry at  
Book \_\_\_\_\_ Page \_\_\_\_\_
4. Assessor's sheet number \_\_\_\_\_, parcel number \_\_\_\_\_
5. Location and Description of Property:

If a bond or security is filed, the construction of ways and installation of municipal services will be completed within \_\_\_\_\_ (not to exceed 5 years).

Signatures of All Owners of Record \_\_\_\_\_  
Address \_\_\_\_\_

A list of names and addresses of the abutters of this subdivision is attached. These names are as they appear on the most recent tax list.

Date Received by Planning Board \_\_\_\_\_

# DEFINITIVE PLAN CHECKLIST

**This checklist is intended to supplement, not to supersede, the existing West Boylston Subdivision Regulations. Any inconsistency between the information on this list and those regulations should be resolved in favor of the regulations.**

## 1. APPLICATION

A Definitive Plan is properly submitted when the Planning Board receives, at one of its regularly scheduled meetings:

- One properly completed Form B (Consult Section V.A.1.a)
- One plan (see above for contents) printed on a mylar transparency sheet, and eleven(11) contact prints of the plan (Consult Section V.A.1.b)
- One properly completed Form D (Consult Section V.A.1.c)
- An abutters list, Form J (see Forms), showing the names and addresses of all abutters to the property included in the Definitive Plan, as determined from the most recent Assessor's list unless the Applicant has more recent knowledge of such abutters (Consult Section V.A.1.d)
- One properly completed Form K (Consult Section V.A.1.e)
- Filing fee (see Fee Schedule in effect on date of filing)

To be filed with the Board of Health:

- A copy of the Form B filed with the Planning Board (Consult Section V.A.2.a)
- One (1) contact print of the Definitive Plan filed with the Planning Board (Consult Section V.A.2.b)

To be filed with the Sewer Commissioners:

- A copy of the Form B filed with the Planning Board (Consult Section V.A.3.a)
- Two (2) contact prints of the Definitive Plan filed with the Planning Board (Consult Section V.A.3.b)

## 2. NOTICE TO THE TOWN CLERK & OTHER TOWN AGENCIES

Deliver by hand or send by certified mail or by registered mail written notice to the Town Clerk that the Definitive Plan has been submitted to the Planning Board. (Consult Section V.A.4)

SECTION X: FORMS

The written notice shall specify:

- The original of the Form B filed with the Planning Board (Consult Section V.A.4)
- The date the Definitive Plan was filed with the Planning Board (Consult Section V.A.4.a)
- A description of the property to which the Definitive Plan is related, sufficient for identification thereof (Consult Section V.A.4.b)
- The name and address of the owner of such property (Consult Section V.A.4.c)

Submit a copy of the written notice given to the Town Clerk and the Form B filed with the Planning Board, and a signed copy of Form M1 (See Forms) to: (Consult Section V.A.4.a-h))

- The West Boylston Water District
- The Director of the Department of Public Works
- The Fire Chief
- The Police Chief
- The Conservation Commission
- The Inspector of Buildings
- The Town's Consultant Engineer
- The Manager of the Municipal Lighting Plant

**NOTE:** If any Town official or agency to whom notice is required to be given by this section requests copies of the plan, the Planning Board may require the Applicant to submit the plan to such Town official or agency. If the plan pertains to property subject to protection under the Watershed Protection Act, St. 1992, c.36, codified at M.G.L. c.92, §§104, 107A, 108, 113 and 113A, the Planning Board may request the Applicant to submit the plan to the Division of Water Supply Protection of the Department of Conservation and Recreation 180 Beaman Street, West Boylston, MA 01583.

**3. THE CONTENTS OF THE DEFINITIVE PLAN .**

- A map of the vicinity (Consult Section V.B.1)
- The plan, prepared in black ink upon mylar transparency sheets (Consult Section V.B)

SECTION X: FORMS

- The proposed locus plan, north point, date, scale, legend, and the title "Definitive Plan" (Consult Section V.B.2)
- The names and addresses of the record owner or owners of the property shown on the plan and the Applicant, if not the owner (Consult Section V.B.3)
- The date or dates of acquisition of the property (Consult Section V.B.3)
- All deed references (Consult Section V.B.3)
- The Town Assessor's sheet number and parcel number for the property (Consult Section V.B.3)
- The name, signature and appropriate seal of the engineer or land surveyor who prepared the plan (Consult Section V.B.3)
- All property boundary lines adjacent to the proposed subdivision (Consult Section V.B.4)
- Zoning information (Consult Section V.B.5)
- Existing and proposed easements, covenants or restrictions applying to the property, together with a statement of the purpose thereof, including setbacks and other dimensional requirements set forth in the West Boylston Zoning Bylaw (Consult Section V.B.6)
- Existing and proposed topography (Consult Section V.B.7)
- The location of all significant, permanent, existing or proposed property features (Consult Section V.B.8)
- Such points or boundary markers as were found in the traverses and/or perimeter surveys after a thorough search has been made (Consult Section V.B.9)
- Information on existing and proposed boundaries of streets (Consult Section V.B.10)
- The names, location, and present widths of all streets within 500 feet of the proposed subdivision (Consult Section V.B.11)
- Proposed lot lines within the property shown on the plan, with approximate areas and dimensions, including frontage, of such lots, and a number on each lot (Consult Section V.B.12)
- Evidence that each lot on the plan, or altered by it, will have the requisite area and frontage required by the West Boylston Zoning Bylaw (Consult Section V.B.13)

SECTION X: FORMS

- Identification of parcels not to be made into lots and their disposition. (Consult Section V.B.14)
- Reference to any required documents such as the vote, covenant, easements deeded to the Town, etc. shall be inscribed on the plan (Consult Section V.B.15)
- Suitable space to record the action of the Planning Board, including space for reference to any considerations or limitations of approval, the date, the signatures of the members of the Planning Board, and the Town Clerk's certificate of no appeal (Consult Section V.B.16)
- The location and boundaries of any land subject to the protections of the *Wetlands Protection Act*, c.131, §40, as amended by the *Rivers Protection Act*, St. 1996, c.258, or the *Watershed Protection Act*, St. 1992, c.36, codified at M.G.L. c.92, §§104, 107A, 108, 113 and 113A (Consult Section V.B.17)
- The volume of earth to be removed in accordance with the requirements of the Earth Removal Board, or a statement that no earth is to be removed during construction of the proposed subdivision (Consult Section V.B.18)
- Existing and proposed drainage systems within or in the vicinity of the proposed subdivision (Consult Section V.B.19)
- Proposed provisions for handling any surface water that drains onto streets adjacent to the proposed subdivision or onto any property not owned by the Applicant, in such a manner as to create drainage problems (Consult Section V.B.20)
- Street and utility construction plans and profiles for each street (Consult Section V.B.21)
- The size and location of existing and proposed water mains, sewer lines, storm drains and appurtenant facilities for water, sewer and other municipal services within or in the vicinity of the proposed subdivision (Consult Section V.B.22)
- Detail drawings (Consult Section V.B.23)
- Construction details of appurtenances, structures, and/or utilities and other pertinent information, as approved in conjunction with the approval of the Definitive Plan (Consult Section V.B.24)
- A plan for the control of erosion and sedimentation (Consult Section VI.L)
- Maintenance plan (Consult Section V.B.26)
- A sketch plan showing a possible or prospective street layout for such adjacent land (Only necessary if the Applicant owns or controls unsubdivided land adjacent to the property shown on the



*SECTION X: FORMS*

Definitive Plan. This sketch plan may be submitted on a separate sheet from the Definitive Plan.)  
(Consult Section V.B.27)

**FORM C**  
**APPLICATION FOR APPROVAL OF A**  
**PRELIMINARY PLAN**

File one completed form with the Planning Board, one with the Board of Health, and the original with the Town Clerk in accordance with the requirements of Section IV.A.

West Boylston Planning Board

\_\_\_\_\_ date

To the Planning Board:

The undersigned, herewith submits the accompanying eleven (11) sets of a Preliminary Plan of the property located in the Town of West Boylston for approval as a subdivision under the requirements of the Subdivision Control Law and the Rules and Regulations Governing the Subdivision of Land in the Town of West Boylston.

1. Name of Applicant \_\_\_\_\_  
Address \_\_\_\_\_
2. Name of Engineer or Surveyor \_\_\_\_\_  
Address \_\_\_\_\_
3. Deed of Property recorded in the \_\_\_\_\_ Registry at  
Book \_\_\_\_\_ Page \_\_\_\_\_
4. Assessor's sheet number \_\_\_\_\_, parcel number \_\_\_\_\_.
5. Location and Description of Property:

Signature of All Owners of Record \_\_\_\_\_  
Address \_\_\_\_\_  
\_\_\_\_\_

A list of names and addresses of the abutters of this subdivision is attached. These names are as they appear on the most recent tax list.

Date Received by Planning Board \_\_\_\_\_

# PRELIMINARY PLAN CHECKLIST

It is strongly recommended that a Preliminary Plan be filed in most cases, even if one is not required. The submission of a Preliminary Plan will enable the Applicant, the Planning Board, other municipal agencies and abutters to discuss and clarify any problems of the proposed subdivision before a Definitive Plan is prepared. The Planning Board's policy is to pursue resolution of as many subdivision issues as possible prior to submission of a Definitive Plan. During its review of the Preliminary Plan, the Planning Board will promote cooperative discussion among all affected citizens and officials of as many such issues as possible.

**This checklist is intended to supplement, not to supersede, the existing West Boylston Subdivision Regulations. Any inconsistency between the information on this list and those regulations should be resolved in favor of the regulations.**

## 1. APPLICATION

A Preliminary Plan is properly submitted when the Planning Board receives, at one of its regularly scheduled meetings:

- One properly completed Form C (Consult Section IV.A.1.a)
- Eleven(11) contact prints of the plan (Consult Section IV.A.1.b)
- Filing fee (see Fee Schedule in effect on the date of filing)

## 2. NOTICE TO THE TOWN CLERK & OTHER TOWN AGENCIES

Deliver by hand or send by registered or certified mail written notice to the Town Clerk that the Preliminary Plan has been submitted to the Planning Board. (Consult Section IV.A.2)

The written notice shall specify:

- The original of the Form C filed with the Planning Board (Consult Section IV.A.2)
- The date the Preliminary Plan was filed with the Planning Board (Consult Section IV.A.2.a)
- A description of the property to which the Preliminary Plan is related, sufficient for identification thereof (Consult Section IV.A.2.b)
- The name and address of the owner of such property (Consult Section IV.A.2.c)

Submit a copy of the written notice given to the Town Clerk and the Form C filed with the Planning Board to:

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- The West Boylston Water District (Consult Section IV.A.3.a)
- The Director of the Department of Public Works (Consult Section IV.A.3.b)
- The Fire Chief (Consult Section IV.A.3.c)
- The Police Chief (Consult Section IV.A.3.d)
- The Conservation Commission (Consult Section IV.A.3.e)
- The Inspector of Buildings (Consult Section IV.A.3.f)
- The Town Consultant Engineer (Consult Section IV.A.3.g)
- The Manager of the Municipal Lighting Plant (Consult Section IV.A.3.h)
- The Board of Sewer Commissioners (Consult Section IV.A.3.i)
- The Board of Health. (Consult Section IV.A.3.j)

**NOTE:** If any Town official or agency to whom notice is not required to be given by this section requests copies of the plan, the Planning Board may require the Applicant to submit the plan to such Town official or agency. If the plan pertains to property subject to protection under the Watershed Protection Act, St. 1992, c.36, codified at M.G.L. c.92, §§104, 107A, 108, 113 and 113A, the Planning Board may request the Applicant to submit the plan to the Division of Water Supply Protection of the Department of Conservation and Recreation 180 Beaman West Boylston, MA 01583

### 3. THE CONTENTS OF THE PLAN

- The plan, prepared in black ink upon mylar transparency sheets (Consult Section IV.B)
- The proposed locus plan, north point, date, scale, legend, and the title "Preliminary Plan" (Consult Section IV.B.1)
- The names and addresses of the record owner or owners of the property shown on the plan and the Applicant, if not the owner (Consult Section IV.B.2)
- The date or dates of acquisition of the property (Consult Section IV.B.2)
- All deed references (Consult Section IV.B.2)

SECTION X: FORMS

- The Town Assessor's sheet number and parcel number for the property (Consult Section IV.B.2)
- The name, signature and appropriate seal of the engineer or land surveyor who prepared the plan (Consult Section IV.B.2)
- All property boundary lines adjacent to the proposed subdivision (Consult Section IV.B.3)
- Zoning information (Consult Section IV.B.4)
- Existing and proposed easements, covenants or restrictions applying to the property, together with a statement of the purpose thereof, including setbacks and other dimensional requirements set forth in the West Boylston Zoning Bylaw (Consult Section IV.B.5)
- The location and boundaries of any land subject to the protections of the *Wetlands Protection Act*, c.131, §40, as amended by the *Rivers Protection Act*, St. 1996, c.258, or the *Watershed Protection Act*, St. 1992, c.36, codified at M.G.L. c.92, §§104, 107A, 108, 113 and 113A (Consult Section IV.B.6)
- The location of all significant, permanent, existing or proposed property features (Consult Section IV.B.7)
- Existing and proposed boundaries of streets, ways, and any public or common areas within the proposed subdivision (Consult Section IV.B.8)
- The names, location, and present widths of all streets within 500 feet of the proposed subdivision (Consult Section IV.B.9)
- Proposed lot lines within the proposed subdivision, with approximate areas, frontage and dimensions of, and a number on each lot (Consult Section IV.B.10)
- Evidence that each lot on the plan, or altered by it, will have the requisite area and frontage required by the West Boylston Zoning Bylaw (Consult Section IV.B.11)
- Identification of parcels that are not to be made into lots and their disposition. (Consult Section IV.B.12)
- The size and location of existing and proposed water mains, sewer lines, storm drains and appurtenant facilities for water, sewer and other municipal services within or in the vicinity of the proposed subdivision (Consult Section IV.B.13)
- Existing and proposed drainage systems within or in the vicinity of the proposed subdivision (Consult Section IV.B.14)

SECTION X: FORMS

- Frontage and area of any remaining adjoining land owned by the Applicant (Consult Section IV.B.15)
- Suitable space to record the action of the Planning Board and the signatures of the members of the Planning Board (Consult Section IV.B.16)
- A sketch plan showing a possible or prospective street layout for such adjacent land shall accompany the Preliminary Plan (Only necessary if the Applicant owns or controls unsubdivided land adjacent to the property shown on the Preliminary Plan. This sketch plan may be submitted on a separate sheet from the Preliminary Plan.) (Consult Section IV.B.17)

**FORM D**  
**DESIGNER'S CERTIFICATE**

File one completed form with the Planning Board in  
accordance with the requirements of Section V.A.

West Boylston Planning Board

\_\_\_\_\_ date

To the Planning Board:

In preparing the plan entitled \_\_\_\_\_

I hereby certify that the above named plan and accompanying data are true and correct, and the source of information about the location of boundaries shown on said plan are:

1. Deed from \_\_\_\_\_ to \_\_\_\_\_  
dated \_\_\_\_\_ and recorded in the \_\_\_\_\_ Registry of Deeds at  
Book \_\_\_\_\_ Page \_\_\_\_\_.
2. Assessor's sheet number and parcel number \_\_\_\_\_.
3. Actual measurements on the ground from a starting point established by
4. Other Plans and/or sources as follows: \_\_\_\_\_  
\_\_\_\_\_

Approval of (circle one):

Signed: \_\_\_\_\_

Registered Professional Engineer or  
Registered Land Surveyor

Engineer  
Land Surveyor

\_\_\_\_\_  
Stamp Number

Address: \_\_\_\_\_  
\_\_\_\_\_

Date Received by Planning Board \_\_\_\_\_

**FORM E**  
**PLANNING BOARD NOTICE TO TOWN CLERK THAT**  
**SUBDIVISION APPROVAL IS REQUIRED**

\_\_\_\_\_ date

Town Clerk  
Town of West Boylston  
West Boylston, Massachusetts

Re: Application for a Determination of Subdivision Approval Requirement  
Form A No. \_\_\_\_\_, Applicant \_\_\_\_\_

This is to notify you that the Planning Board has determined that the plan entitled \_\_\_\_\_, and dated \_\_\_\_\_, by \_\_\_\_\_, showing lots designated and located as follows \_\_\_\_\_, Assessor's sheet number \_\_\_\_\_, parcel number \_\_\_\_\_, submitted by the above Applicant on \_\_\_\_\_

REQUIRES APPROVAL under the Subdivision Control Law.

WEST BOYLSTON PLANNING BOARD

By: \_\_\_\_\_

Date Received by Town Clerk: \_\_\_\_\_



**FORM F**  
**CERTIFICATE OF APPROVAL**  
(Consult Section V.J.)

\_\_\_\_\_ date

This is to certify that the Planning Board of the Town of West Boylston, Massachusetts has this day approved a Definitive Subdivision Plan entitled \_\_\_\_\_ submitted by \_\_\_\_\_ for property owned by \_\_\_\_\_, dated \_\_\_\_\_. This approval is subject to receipt of a covenant or other proper security under M.G. L. c. 41, §81U, as amended, to secure the construction of ways and the installation of municipal services in accordance with the Rules and Regulations of the Planning Board of the Town and the plans now on file with the Planning Board.

This approval is further subject to the following terms and conditions:

- 1.
- 2.

Majority of the Planning Board  
of the Town of West Boylston

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**FORM G**  
**PERFORMANCE SECURED BY**  
**DEPOSIT OF MONEY**  
(Consult Section V.I)

AGREEMENT made this date between the Town of West Boylston and \_\_\_\_\_, hereinafter referred to as "the applicant," address \_\_\_\_\_, to secure construction of ways and installation of municipal services in the subdivision of land shown on a plan entitled: \_\_\_\_\_, by: \_\_\_\_\_, dated: \_\_\_\_\_, owned by: \_\_\_\_\_, address: \_\_\_\_\_ land located: \_\_\_\_\_ and showing \_\_\_\_\_ proposed lots.

The applicant hereby binds and obligates himself, his, or its executors, administrators, devisees, heirs, successors and assigns to the Town of West Boylston, a Massachusetts municipal corporation, acting through its Planning Board, in the sum of \_\_\_\_\_ dollars, and has secured this obligation by depositing with the Treasurer of said Town of West Boylston, a deposit of money in the above sum to be placed in a subdivision escrow account in the name of the Town of West Boylston. The deposit of money is to be used to insure the performance by the applicant of all covenants, conditions, agreements, terms, and provisions contained in the following:

1. Application for Approval of Definitive Plan dated: \_\_\_\_\_;
2. The subdivision control law and the West Boylston Planning Board's Rules and Regulations governing this subdivision;
3. Conditions included in the Certificate of Approval issued by the Planning Board and dated \_\_\_\_\_;
4. Engineering Consultant Recommendations, dated: \_\_\_\_\_;
5. The Definitive Plan as qualified by the Certificate of Approval; and
6. Other document(s) specifying construction or installation to be completed, namely: (specify other documents, if any, and list lots secured if only a part of the subdivision is secured by a deposit of money)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

This agreement shall remain in full force and effect until the applicant has fully and satisfactorily performed all obligations.

Upon completion by the applicant of all obligations as specified herein, on or before \_\_\_\_\_ or such later date as may be specified by vote of the Planning Board with the written concurrence of the

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applicant, the deposit of money, including all interest accrued thereon, shall be returned to the applicant by the Town of West Boylston and this agreement shall become void.

In the event the applicant should fail to satisfactorily complete the construction of ways and installation of municipal services as specified in this agreement and within the time herein specified, the deposit of money shall be applied in whole, or in part, by the Planning Board for the benefit of the Town of West Boylston to the extent of the reasonable cost to the Town of West Boylston of completing such construction or installation as specified in this agreement. Any unused money and the interest accrued on the deposit of money will be returned to the applicant upon completion of the work by the Town of West Boylston.

The Town of West Boylston, acting by and through its Planning Board, hereby agrees to accept the aforesaid deposit of money in the amount specified in this agreement as security for the performance of the project as aforesaid. The approved Definitive Plan shall not be endorsed until this Agreement is signed by all parties and the security has been deposited with the Town.

Any amendments to this agreement and/or to the aforesaid security shall be agreed upon in writing by all parties to this agreement.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this \_\_\_\_\_ of \_\_\_\_\_

Majority of the Planning Board  
of the Town of West Boylston

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
Signature of Applicant  
FID or SS #: \_\_\_\_\_

COMMONWEALTH OF MASSACHUSETTS

\_\_\_\_\_, ss.

On this \_\_\_\_\_ day of \_\_\_\_\_, 200\_, before me, the undersigned Notary Public, personally appeared \_\_\_\_\_, who proved to me through satisfactory evidence of identification, which were \_\_\_\_\_, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he/she/they signed it voluntarily for its stated purpose, as members of the Planning Board of the Town of West Boylston.

\_\_\_\_\_  
, Notary Public

My Commission expires: \_\_\_\_\_

COMMONWEALTH OF MASSACHUSETTS

\_\_\_\_\_, ss

On this \_\_\_\_\_ day of \_\_\_\_\_, 200\_, before me, the undersigned Notary Public, personally appeared \_\_\_\_\_, who proved to me through satisfactory evidence of identification, which were \_\_\_\_\_, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he/she signed it voluntarily for its stated purpose, as \_\_\_\_\_ of \_\_\_\_\_.

\_\_\_\_\_  
(Official Signature and Seal of Notary)

Duplicate copy to: Applicant  
Planning Board  
Town Clerk  
Town Treasurer

# FORM I RELEASE OF LOTS

West Boylston Planning Board

\_\_\_\_\_ date

The undersigned, being a majority of the Planning Board of the Town of West Boylston, Massachusetts, hereby certify that the requirements for work on the ground called for by a Conditional Approval Contract, dated \_\_\_\_\_, and recorded in Worcester Registry of Deeds at Book \_\_\_\_\_, Page \_\_\_\_\_, (or registered in Worcester Land Registry District as Document Number \_\_\_\_\_, and noted on Certificate of Title Number \_\_\_\_\_, in Registration Book \_\_\_\_\_, Page number \_\_\_\_\_), have been completed to the satisfaction of the Planning Board as to the following enumerated lots shown on Plan, entitled \_\_\_\_\_, recorded with said Deeds at Plan Book \_\_\_\_\_, Plan \_\_\_\_\_, (or registered in said Land Registry District at Plan Book \_\_\_\_\_, Plan \_\_\_\_\_), and said lots are hereby released from the restrictions as to sale and building specified thereon.

Lots designed on said Plan as follows:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Majority of the Planning Board  
of the Town of West Boylston

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### COMMONWEALTH OF MASSACHUSETTS

\_\_\_\_\_, ss.

On this \_\_\_\_\_ day of \_\_\_\_\_, 200\_, before me, the undersigned Notary Public, personally appeared \_\_\_\_\_, who proved to me through satisfactory evidence of identification, which were \_\_\_\_\_, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he/she/they signed it voluntarily for its stated purpose, as members of the Planning Board of the Town of West Boylston.

\_\_\_\_\_  
(Official Signature and Seal of Notary)

**FORM J**  
**ABUTTERS LIST**

Two copies of this form must be included with Form B. The list of abutters must be checked by the Board of Assessors before being submitted to the Planning Board.  
(Consult Section V.A.1.d)

West Boylston Planning Board

\_\_\_\_\_ date

To the Planning Board:

The undersigned, believing that the following list of names includes all abutters (within 300') to the subdivision named below, including property owners across roads from the subdivision, has checked this list with the Clerk of the Board of Assessors.

<b>Name of Abutter</b>	<b>Mailing Address of Abutter</b>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Name of Subdivider \_\_\_\_\_

Name of Subdivision \_\_\_\_\_

Clerk of Assessors Signature \_\_\_\_\_

Date \_\_\_\_\_

Date Received By Planning Board: \_\_\_\_\_

**FORM K**  
**PROPOSED STREET NAME(S)**

One completed copy of this form, should be submitted with Form B,  
in accordance with the requirements of Section V.A.1.e

West Boylston Planning Board

\_\_\_\_\_ date

To the Planning Board:

The undersigned Applicant requests the Board's approval of the following proposed names of streets within the proposed subdivision shown on a plan entitled \_\_\_\_\_

\_\_\_\_\_.

Proposed Street Name(s): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Reason for the Proposed Names: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Applicant's signature \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

The Planning Board requests your comments on this application for approval of street name(s).

Signed: \_\_\_\_\_

Planning Board

Date application sent to Fire Chief : \_\_\_\_\_

Fire Chief \_\_\_\_\_

Date: \_\_\_\_\_

Comments \_\_\_\_\_

**FORM M1**  
**PLAN REVIEW REPORT FORM**

TO: \_\_\_\_\_

FROM: \_\_\_\_\_

DATE: \_\_\_\_\_

SUBJECT: Comments and recommendations regarding the Definitive Subdivision Plan entitled  
\_\_\_\_\_

and dated: \_\_\_\_\_

Of the above-named subdivision plan insofar as its area of jurisdiction is concerned, the undersigned recommends (circle one):

Approval.

Approval with modifications.

Disapproval.

The reasons for this recommendation are as follows:

\_\_\_\_\_  
Name of officer, agency, or board

NOTE: The Planning Board will take into consideration any recommendations made hereon before taking final action on the Definitive Subdivision Plan. Lack of a timely report by any officer, agency, or board will be so recorded in the minutes of the Planning Board.

Date Received by Planning Board \_\_\_\_\_



**FORM M2**  
**REFERRAL FORM**  
(Consult Section V.F)

West Boylston Planning Board

\_\_\_\_\_ date

TO: \_\_\_\_\_ West Boylston Water District \_\_\_\_\_ Building Inspector/Zoning Officer  
 \_\_\_\_\_ Sewer Commissioners \_\_\_\_\_ Board of Selectmen  
 \_\_\_\_\_ Director of the Department of Public Works \_\_\_\_\_ Conservation Commission \_\_\_\_\_  
 \_\_\_\_\_ Police Department  
 \_\_\_\_\_ Fire Department \_\_\_\_\_ Mgr. Municipal Lighting Plant  
 \_\_\_\_\_ Town Consultant Engineer  
 \_\_\_\_\_ Other \_\_\_\_\_

A Definitive Suidivision plan entitled " \_\_\_\_\_ " and dated \_\_\_\_\_, submitted to the Planning Board on \_\_\_\_\_, by \_\_\_\_\_, whose address is \_\_\_\_\_  
 \_\_\_\_\_ In accordance with the West Boylston Subdivision Rules and Regulations, this plan has been submitted to your agency for review and recommendations. Please consider the following subject area(s), among others, in your review of this plan:

Note: Planning Board to check off applicable subject area(s) to be reviewed.

_____ Water system	_____ Open space
_____ Sewer system	_____ Street lights
_____ Road design and layout	_____ Street names
_____ Wetlands, floodplains	_____ Health
_____ Fire protection	_____ Traffic
_____ Police protection	_____ Utility system:
_____ Engineering specifications	_____ gas
_____ Drainage	_____ electric
_____ Erosion and sediment controls	_____ telephone
_____ Other _____	

Please make any comments and recommendations regarding this plan on the attached form, or in a written report, and submit to the Planning Board no later than \_\_\_\_\_.

Clerk, Planning Board

For Your Information: A public hearing has been scheduled for \_\_\_\_\_ p.m. on \_\_\_\_\_ at \_\_\_\_\_ to discuss this plan. The Planning Board may disapprove the plan only if it fails to conform to the Rules and Regulations of the Planning Board or the recommendations of the Board of Health.

**SECTION XI PLATES**

The following plates are included as supplement to Sections VI: Design Standards.

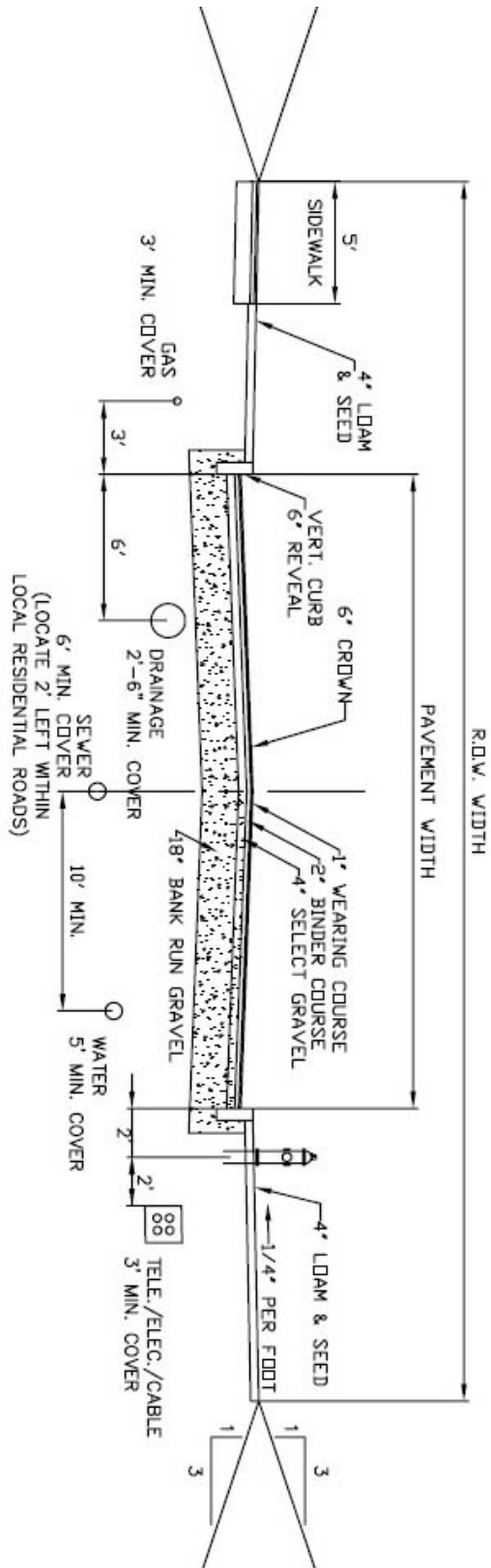


Plate 1: Typical Roadway Cross Section

**SECTION XII MODEL HOMEOWNERS MAINTENANCE TRUST**

{Trust Name}  
MAINTENANCE TRUST  
DECLARATION OF TRUST

THIS DECLARATION OF TRUST made this day of {date}, by {Sponsor}, of {address}, {city}, {county}, {state}, who hereby declare that he and his successors in Trust hereunder will hold for the benefit of the beneficiaries hereunder upon the terms herein set forth all of the rights and powers in and with respect to the land and structures and easements held by said Trustees as and for the purposes set forth in this Declaration of Trust.

ARTICLE I

NAME AND ADDRESS OF TRUST

Section 1.1 The Trust hereby created shall be known as the {Trust Name} and under that name, so far as legal, convenient and practical, all business should be carried on by the Trustees and all instruments shall be executed by the Trustees in that name (and the word "Trustee" whenever used in this Declaration of Trust, except where the context otherwise requires) shall refer to the Trustees in their capacity as Trustees, and not individually or personally, and shall not refer To the officers, agents or employees of the Trust or to the, Homeowners as later defined in the Declaration of Trust.

The initial address of the Trust shall be {address}, {city} {state} {zip code}.

ARTICLE II

THE TRUST AND ITS PURPOSES

Section 2.1 The association created by this Trust shall be known as the "{Association} Homeowners' Association" for the purpose of maintaining and preserving detention basins, any fences which may be constructed surrounding such basins and drainage pipes and appurtenances on the Property as hereinafter defined. {The previous sentence should be modified for the purpose of the trust.}

Section 2.2 The purpose set forth in Section 2.1 shall be the sole purpose of the Trust.

Section 2.3 It is hereby expressly declared that the Trust is not intended to be, shall not be deemed to be and shall not be treated as a general partnership, limited partnership, joint venture, corporation or joint stock company and that the Homeowners are beneficiaries and not partners or associates nor in any other relation to the Trustees other than as beneficiaries, with only such rights and liabilities as are set forth in this Declaration of Trust.

ARTICLE III

DEFINITIONS

In this Declaration of Trust, wherever the context permits, the following words shall have, respectively, the following meanings:

Section 3.1 "Bylaws" shall mean bylaws of this Association contained in Article VI hereof as the same may be amended from time to time.

SECTION XII: MODEL HOMEOWNERS MAINTENANCE TRUST

Section 3.2 "Declaration of Trust" shall mean this Declaration of Trust as amended, restated or modified from time to time. Reference in this Declaration of Trust to "hereof", "herein", "hereunder" and "hereafter" shall be deemed to refer to the Declaration of Trust and shall not be limited to the particular text, article or section in which such words appear.

Section 3.3 "Declaration Of Covenants" shall mean "{Covenant for Access, Slope, Utility and/or Drainage Easements name}" and its attached "{Operations and Maintenance Protocol}" recorded herewith and incorporated by reference.

Section 3.4 "Development" shall mean Lots {} through {} as shown on said Plan, whether improved or unimproved, and any revisions thereto.

Section 3.5 "Home" shall mean the land comprising any one lot (Lots {} on the Plan) of the Development as shown on the Plan and any buildings thereon.

Section 3.6 "Homeowner" shall mean the person or persons owning a lot shown on the Plan and his personal representatives, successors and assigns.

Section 3.7 "Percentage's. Any given percentage of Homeowners shall mean that Homeowner's percentage interest in the aggregate interest of the undivided ownership of the Property and of the beneficial interest in the Trust.

Section 3.8 "Person" or "Persons" shall mean any person or persons, whether acting in an individual, representative, or fiduciary capacity, and any firm or firms, corporation or corporations, partnership or partnerships, and any legal entity or entities whatsoever.

Section 3.9 "Plan" shall mean the following plans and any subsequent revisions thereto:

(1) a Plan of Land entitled "{Plan Name}" prepared for {Applicant}, scale: {scale}, dated {date}, as revised, prepared by {Engineer or Firm}, Civil Engineers & Land Surveyors, {city} {state}. Said Plan recorded at the Worcester District Registry of Deeds, Book \_\_\_\_\_, Plan \_\_\_\_\_;

(2) Any revisions to the above that are recorded subsequent to the date hereof.

Section 3.10 "Property" shall mean real estate known as {list the easements and the lots on which they are found} as shown of the Plan.

Section 3.11 "Rules and Regulations" shall mean any rules and regulations for the operation of the Trust.

Section 3.12 "Sponsor" shall mean {Sponsor} {address} {city} {state} {zipcode}.

Section 3.13 "Trust Expenses" shall mean the expenses of ownership, maintenance, insuring repair or replacement of the Trust Property and expenses declared Trust Expenses herein.

Section 3.14 "Trust Funds" shall mean all funds held by the Trustees.

Section 3.15 "Trust Profits" shall mean the balance of all income from the Trust Funds remaining after deduction of the Trust Expenses.

Section 3.16 "Trust" shall mean the organization of Homeowners, which is created by this instrument.

Section 3.17 "Trust Property" shall mean any and all property, whether real, personal or mixed, tangible or intangible, held by the Trustees under the terms and provisions of this Declaration of Trust on behalf of the Trust.

Section 3.17 "Trustee" or "Trustees" shall mean a Trustee or Trustees for the time being under this Declaration of Trust, however appointed, and the rights, powers, authority and privileges granted hereunder to the Trustees may be exercised by such person or persons.

#### ARTICLE IV

#### THE TRUSTEES

Note: the total number of trustees and the number required for actions described herein may vary with the size of the development.

Section 4.1 — Numbers and Vacancy. During the development and construction of the Development, the Sponsor shall have the exclusive rights to determine the number of Trustees and designate who shall serve a Trustee.

Upon the elapse of three (3) months after one hundred (100%) percent of the lots in the Subdivision have been conveyed to purchasers or upon the elapse of four (4) years after the first lot has been conveyed to a purchaser, whichever shall first occur, the Sponsor shall transfer control of the Trust to the Homeowners. The Homeowners shall elect, by majority vote, three (3) Trustees to each serve for a term of two (2) years. If for any reason any vacancy in the office of Trustee shall continue for more than sixty (60) days, a Trustee or Trustees to fill such vacancy or vacancies may be appointed by any court of competent jurisdiction upon the application of any Homeowner, Trustee or upon the failure of a Homeowner or Trustee to so apply, by the Town of West Boylston Planning Board, and notice to all other Homeowners and Trustees and to such other parties in interest, if any, to whom the court may direct that notice be given. Notwithstanding any foregoing provisions of this Section 4.1 to the contrary, during the period of any vacancy, however caused and for whatever duration, the remaining Trustees, subject to the provisions of Section 4.2, shall continue to exercise and discharge all of the powers, discretions and duties conferred or imposed upon the Trustees of Trustee without the necessity of any deed or transfer or conveyance.

If and whenever the number of such Trustees shall become less than three (3), a vacancy or vacancies of said office shall be deemed to exist. Each such vacancy shall be filled by an instrument in writing setting forth (a) the appointment of a natural person to act as such Trustee, signed (i) by two Homeowners who shall certify under oath that Homeowners entitled to not less than thirty-three (33%) percent of the Beneficial Interest have voted to make such appointment or (ii) if Homeowners entitled to such percentage have not within Thirty (30) days after the occurrence of any such vacancy have not made such appointment, by a majority of the then remaining Trustees or by the sold remaining Trustee if only one; and (b) the acceptance of such appointment signed and acknowledged by the person so appointed. Such appointment shall become effective upon the recording with the Worcester District Registry of Deeds of a certificate of such appointment signed by a majority of the then remaining Trustees or by the sold remaining Trustee, as the case may be, or if there shall be no remaining Trustee, by the two (2) Homeowners who have certified the vote pursuant to the clause (i) of this Section 4.1 on behalf of all the Homeowners, together with such acceptance, and such person shall then be and become such Trustee and shall be vested with title to the Trust Property jointly with the remaining Trustees or Trustee without the necessity of any act of transfer or conveyance. If for any reason any vacancy in the office of Trustee shall continue for more than Sixty (60) days and shall at the end of that time remain unfilled, a Trustee or Trustees to fill such vacancy or vacancies may be appointed by any Court of competent jurisdiction upon the application of any Homeowner or Trustee and notice to all Homeowners and Trustees and to such other parties of interest, if any to who the Court may direct that notice be given. The foregoing provisions of this Section to the contrary notwithstanding, despite any vacancy in the office of Trustees, however caused and for whatever duration, the remaining Trustees subject to the provisions of this Declaration of Trust shall continue to exercise and discharge all of the powers, discretions and duties hereby conferred or imposed by the Trustees.

Section 4.2 — Trustee Action By a Majority. The Trustees may act by majority vote at any duly

*SECTION XII: MODEL HOMEOWNERS MAINTENANCE TRUST*

called meeting at which a quorum is present; and a quorum shall consist of a majority of the Trustees, but in no event less than two (2) Trustees. The Trustees, provided there shall be at least two (2) Trustees in office, may also act without a meeting if a written assent thereto is signed by at least two-thirds of the Trustees then in office.

Section 4.3 — Resignation and Removal. Any Trustee may resign at any time by instrument in writing, signed and acknowledged, and delivered to any other Trustee then in office. By vote of Homeowners entitled to not less than ninety (90%) percent of the Beneficial Interest, any Trustee may be removed with or without cause and the vacancy among the Trustee caused by such removal shall be filled in the manner above provided. The original Trustees and any successor Trustees designated by the original Trustees shall be exempt from removal pursuant to the terms of this provision.

Section 4.4 — Surety Bonds. No Trustee named or appointed as herein before provided, whether as original Trustee or as successor to or as substitute for another, shall be obliged to give any bond or surety or other security for the performance of any of his duties hereunder, unless owners entitled to not less than fifty — one (51%) percent of the Beneficial Interest, shall vote that any one or more of the Trustees shall give bond in such amount and with such sureties as shall be specified in such vote. Any cost of such bond shall be a Trust Expense.

Section 4.5 — Compensation. No Trustee shall receive any compensation for serving as such; provided, however, each Trustee shall be entitled to reimbursement for all reasonable expenses incurred by him on behalf of the Trust.

Section 4.6 — No Personal Liability. No Trustee shall under any circumstance or in any event be held liable or accountable out of his personal assets by reason of any action taken, suffered or omitted by him in good faith while serving as Trustee, or for allowing one or more of the other Trustees to have possession of the trust books or property, or be so liable, accountable or deprived by reason of honest errors of judgment or mistakes of fact or law, except for willful acts in bad faith.

Section 4.7 — Trustees May Deal With Trust. No Trustee shall be disqualified by reason of being a Trustee from contracting or dealing with the Trustees or with one or more owners (whether directly or indirectly) because of such Trustee's interest, personally or as Trustee, or because of any owner's interest in any corporation, firm, trust or other organization connected with such contracting or dealing or because of any other reason, as vendor, purchaser or otherwise, nor shall any such dealing, contract or arrangement entered into with respect to this Trust in which any Trustee shall be in any way interested be avoided, nor shall any Trustee so dealing or contracting or being so interested be liable to account for any profit realized by any such dealing, contract or arrangement by reason of such Trustee's holding office or because of the fiduciary relation hereby established, provided the Trustee shall act in good faith and shall disclose the nature of such Trustee's interest before the dealing, contract or arrangement is entered into.

Section 4.8 — Indemnity. The Trustees and each of them shall be indemnified out of the Trust Property and by the Homeowners in proportion to their Beneficial Interest, against any liability incurred by them or any of them in the carrying out of their duties hereunder, including, without limiting the generality of the foregoing, liabilities in contract and in tort and liabilities for damages, penalties and fines.

Section 4.9 — Arbitration. Subsequent to the turnover of control by the Sponsor as provided in Article IV, Section 4.1, notwithstanding anything to the contrary in this Trust, in the event that the Homeowners, or Trustees, shall be unable to act for failure of a majority vote, with respect to any matters contained herein, and after ten (10) days written notice of the deadlock shall not have resolved within thirty (30) days after such notice, then either the Trustees or Homeowners may submit the matter to arbitration, and for that purpose, one arbitrator shall be designated by the Trustees, one by the Homeowners, and a third by the two arbitrators so designated, and the decision of such arbitrators shall be binding. Arbitration shall be conducted in accordance with the rules and procedures of the American Arbitration Association.

ARTICLE V

SECTION XII: MODEL HOMEOWNERS MAINTENANCE TRUST

Section 5.1 — Beneficial Interest. The Beneficial Interest in the Trust Property shall be in the Homeowners. The total Beneficiary Interests in the Trust shall be divided among the Homeowners in the same percentage interest as their respective interest in the Trust Property, which shall be a {fraction} interest attributable to each lot in the Development.

Section 5.2 — Each Home to Vote by One Person. Each Beneficial Interest shall be exercised by one person and shall not be divided among several owners of any Home. To that end, whenever any Home is owned of record by more than one person, the several owners of such Home shall designate, by a notice in writing to the Trustees signed by all of the record owners of such Home, one of such owners who shall be authorized and entitled to cast votes, execute instruments and otherwise exercise the rights appertaining to such Home hereunder. Such designation shall take effect upon receipt of said notice by the Trustees and may be changed at any time from time to time by notice as aforesaid. In the absence of any such notice of designation, the Trustees may designate, by written notice to all such owners, any one such owner for such purposes.

ARTICLE VI

BYLAWS

The provisions of this Article VI shall constitute the Bylaws of this Trust (the “Bylaws”) and the organization of Homeowners established hereby:

Section 6.1 — Powers of the Trustees. The Trustees shall have all the powers and duties necessary for the administration of the Trust and Trust Property and may do all things, subject to and in accordance with all applicable provisions of applicable law, and, without limiting the generality of the foregoing the Trustees may, with full power and uncontrolled discretion, at any time and from time to time without the necessity of obtaining any approval or license of any court for leave to do so;

- (i) retain the Trust Property, or any part or parts thereof, in the same form or forms of investment in which received or acquired by them so far and so long as they shall think fit, without liability for any loss resulting therefrom;
- (ii) acquire title to any property or rights in property, (including any Home) real or personal, and to own, manage, use and hold such property and such rights;
- (iii) enter into any arrangement for the use or occupation of the Trust Property, or any part or parts thereof, including, without thereby limiting the generality of the foregoing easements, upon such terms and conditions and with such stipulations and agreements as they shall deem desirable, even if the same extend beyond the possible duration of this Trust;
- (iv) invest and reinvest the Trust Property, or any part or parts thereof, and from time to time, as often as they shall see fit, to change investments, including investment in all securities and other property, of whatsoever nature and however denominated, all to such extent as to them shall seem proper, and without liability for loss even though such property or such investments shall be of a character or in an amount not customarily considered proper for the investment of trust funds or which does or may not produce income; notwithstanding the foregoing, no money may be invested in any entity in which the Trustees have an interest, whether direct or indirect;
- (v) incur such liabilities, obligations and expenses and pay from the principal or the income of the Trust Property in their hands all such sums as they shall deem necessary or proper for the furtherance of the purposes of this Trust;
- (vi) to determine whether receipt by them constitutes principal or income or surplus and to allocate between principal and income and to designate as capital or surplus any of the

**SECTION XII: MODEL HOMEOWNERS MAINTENANCE TRUST**

funds of this trust;

- (vii) vote in such manner as they shall think fit any or all shares in any corporation or trust which shall be held as Trust Property, and for that purpose give proxies to any person, persons or to one or more of their number, vote, waive any notice or otherwise act in respect of any such shares;
- (viii) deposit any funds of the Trust in any bank or trust company, and delegate to any one or more of their number, or to any other person or persons, the power to deposit, withdraw and draw checks on any funds of the Trust;
- (ix) maintain such offices and other places of business in the Commonwealth of Massachusetts as they shall deem necessary or proper;
- (x) employ, appoint and remove such agents, managers, officers, board of managers, brokers, engineers, architects, employees, servants, assistants and counsel (which counsel may be a firm of which one or more of the Trustees are members) as they shall deem proper for the purchase, sale or management of the Trust Property, or any part or parts thereof, or for conducting the business of the Trust, and may define their respective duties and fix and pay their compensation, and the Trustees shall not be answerable for the acts and defaults of any such person. The Trustees may delegate to any such agent, manager, officer, board, broker, engineer, architect, employee, servant, assistant or counsel any or all of their powers (including discretionary powers, except that the power to join in amending, altering, adding to, terminating or changing this Declaration of Trust and the Trust hereby created shall not be delegated) all for such times and purposes as they shall deem proper. Without hereby limiting the generality of the foregoing, the Trustees may designate from their number a Chairperson, a Treasurer, a Secretary, and such other officers as they deem fit, and may from time to time designate one or more of them to be the Managing Trustee or Managing Trustees for the management and administration of the Trust Property and the business of the Trust, any part or parts thereof;
- (xi) improve any property owned by the Trust;
- (xii) manage, maintain, repair, restore, and improve the Trust Property and enter into contracts for same;
- (xiii) determine the Trust Expenses required for the affairs of the Trust Property
- (xiv) collect the Trust Expenses from the Homeowners;
- (xv) adopt and amend rules and regulations covering the details of the operation and use of the Trust Property;
- (xvi) obtain insurance covering the Trust Property.
- (xvii) enforce obligations of the Homeowners and have the power to levy fines against the Homeowners for violations of reasonable Rules and Regulations established by the Trustees to govern the conduct of the Homeowners. No fine may be levied for more than \$10 for any one violation, but for each day a violation continues after written notice, it shall be considered a separate violation. All such fines shall be deemed an assessment against such Homeowner;
- (xviii) generally, in all matters not herein otherwise specified, to control and to do each and every thing necessary, suitable, convenient, or proper for the accomplishment of any of the purposes of the Trust or incidental to the powers herein to manage and dispose of the Trust Property as if the Trustees were the absolute owners thereof and to do any and all acts, including the execution of any instruments, which by their performance thereof shall be



shown to be in their judgment for the best interest of the Homeowners.

Provided, however, that the Trustees shall abide by all covenants made with and requirements of the Town of West Boylston Planning Board and West Boylston Department of Public Works, and their successors thereto and any other government or municipal agencies having proper jurisdiction over the Trust Property.

Section 6.2 – Operation, Maintenance, Repair and Replacement of Trust Property, Assessment of Trust Expenses Therefor. The Trustees shall be responsible for the proper maintenance, operation, repair and replacement of the Trust Property, but a qualified firm shall maintain the stormwater appurtenances, and any two Trustees or a managing agent or any others who may be so designated by the Trustees may approve payment of vouchers for such work. The expenses of such maintenance, operation, repair and replacement shall be assessed to the Homeowners as Trust Expenses at such times and in such amounts as provided in Section 6.3.

Section 6.3 – Trust Expense Funds.

Section 6.3.1 – Reserve Funds. The Homeowners shall be liable for Trust Expenses and, subject to the Trustees' judgment as to reserve and contingent liability funds stated below, shall be entitled to surplus accumulations (Trust Profits), if any, of the Trust in proportion to their beneficial interest in the Trust. The Trustees shall, to the extent they deem advisable, set aside Trust Funds for reserve or contingent liabilities, and may use the funds so set aside for reduction of indebtedness or other lawful capital purposes, or subject to the provision of the following Section 6.3.2 and 6.3.3, for repair, rebuilding or restoration of the Trust Property or for improvements thereto, and the funds so set aside shall not be deemed to be Trust Profits available for distribution. Upon the transfer of each lot with a dwelling located thereon, the Buyer shall be obligated to pay a capital reserve amount of {} Hundred and 00/100ths (\${}.00) Dollars.

Section 6.3.2 – Estimates of Trust Expenses and Assessments. At least thirty (30) days prior to the commencement of each fiscal year of this Trust, the Trustees shall estimate the Trust Expenses expected to be incurred during the next fiscal year together with a reasonable provision for contingencies and reserves, and after taking into account any undistributed surplus accumulations from prior years, shall determine the assessment to be made for the next fiscal year.

In the event that the Trustees shall determine during any fiscal year that the budget is less than the Trust Expenses actually incurred, or in the reasonable opinion of the Trustees likely to be incurred, the Trustees shall make a supplemental assessment or assessments, and such assessments shall be payable within thirty (30) days after the same are rendered. The amount of each annual and/or supplemental assessment shall be the personal liability of each Homeowner (jointly and severally among the owners of each Home); and if not paid when due shall constitute a lien against the Homeowner's property; and if not paid when due, or upon the expiration of such grace period as the Trustees may (but need not) designate, each such Homeowner shall pay interest on such unpaid amount at an interest rate determined from time to time by the Trustees together with the cost of collection of such amounts, including reasonable attorneys' fees. Each Homeowner, by acceptance of the Deed to his Home, agrees to pay all costs and expenses, including reasonable attorneys' fees and costs of collection incurred by the Trustees in collection of said assessments.

In the event an assessment against a Home remains unpaid for more than thirty (30) days from its due date, the Trustees shall take whatever lawful action they deem necessary to collect such assessment. All rights and remedies of the Trustees with respect to collection of delinquent assessments shall be cumulative.

The Trustees may designate one or more of the Trustees or an officer or agent who shall have the authority to issue certificates on behalf of the Trust indicating the status of unpaid Trust Expenses assessed against a Home if requested by parties deemed appropriate by the Trustees.

Section 6.3.3 – Application of Trust Funds. The Trustees shall expend Trust Funds only for the purposes permitted by this Trust and as may be required by law.

Section 6.4 — Rebuilding and Restoration. Improvements and Condemnation.

Section 6.4.1 — Submission to Homeowners of Proposed Improvements. If and whenever the Trustees shall propose to make any improvement to the Trust Property, or shall be requested in writing by the Homeowners holding fifty (50%) percent or more of the beneficial interest in this Trust to make any such improvement, the Trustees shall submit to all Homeowners a form of agreement (which may be in several counterparts) specifying the improvement or improvements proposed to be made and the estimated cost thereof, and authorizing the Trustees to proceed to make the same. Upon delivery to the Trustees of such agreement signed by fifty one (51%) percent or more of the Homeowners, or the expiration of ninety (90) days after such agreement was first submitted to the Homeowners, whichever shall first occur, the Trustees shall notify all Homeowners of the percentage of Homeowners who have then signed such agreement. If such percentage is fifty one (51%) percent or more of the Homeowners, the Trustees shall proceed to apply to the appropriate municipal body for approval of such improvement, when and if such approval is received, the Trustees shall make the improvement or improvements specified in such agreement and shall charge the cost of such improvement to all the Homeowners.

Section 6.4.2 — Condemnation. In the event of a total or partial taking under the powers of eminent domain, the Homeowners shall be represented by the Trustees hereunder, all awards or damages shall be payable to the Trustees for the benefit of the Homeowners and their mortgage holders and the taking shall be treated as (i) a casualty loss, or (ii) a termination of the Trust and shall be governed by the applicable provisions of this Trust. By the acceptance of a deed to a Home, each Homeowner irrevocably appoints the Trustees hereunder as his attorneys-in-fact to execute all instruments necessary to accomplish a just and equitable adjustment of such proportionate interests if such a situation occurs.

Section 6.4.3 — Arbitration of Disputed Trustee Action. Notwithstanding anything to the contrary in this Trust: (a) In the event that any Homeowner(s), shall dissent from any determination of the Trustees with respect to the value of the Trust Property or any other determination or action of the Trustees under this Article V by notice in writing to the Trustees within ten (10) days after such determination or action, and such dispute shall not be resolved within thirty (30) days after such notice, then either the Trustees or the dissenting Homeowner(s) shall submit the matter to arbitration. For that purpose, one arbitrator shall be designated by the Trustees, one by the dissenting Homeowner(s) and a third by the two arbitrators so designated. Such arbitration shall be conducted in accordance with the rules and procedures of the American Arbitration Association and shall be binding upon all parties. The Trustees' decision that work constitutes a repair, rebuilding or restoration other than an improvement shall be conclusive unless shown to have been made in bad faith. The Trustees shall in no event be obliged to proceed with any repair, rebuilding or restoration, or an improvement, unless and until they have received funds in an amount equal to the Trustees' estimate of all costs thereof.

Section 6.4.4 — Managing Business Agent. The Trustees may, at their discretion, appoint a manager or managing agent to administer the management and operation of the Trust Property, including the incurring of expenses, and making of disbursements and the keeping of accounts, as the Trustees shall from time to time determine. The Trustees or such manager or managing agent may appoint, employ and remove such additional agents, attorneys, accountants or employees, as the Trustees shall determine. Any agreement with respect to services to the Trust must be terminable by either party on not more than ninety (90) days' notice without a termination fee.

Section 6.4.5 — Maintenance Company. The Trustees shall contract with an appropriate maintenance company for the purpose of the day-to-day maintenance of the detention basin(s) and appurtenances thereto. Any contract with such a maintenance company shall be approved in advance by the West Boylston Department of Public Works.

Section 6.4.6 — Rules, Regulations, Restrictions and Requirements. The Trustees may at any time and from time to time adopt, amend and rescind administrative rules and regulations governing the use and maintenance of the detention basin(s) as is consistent with provisions of any maintenance contract and consistent with the Declaration of Covenants recorded herewith in effect at the time of such action by the

Trustees.

Section 6.5 — Insurance. The Trustees may, if they deem appropriate, obtain and maintain master policies of casualty and physical damage insurance for the benefit and protection of the Trust, the Trustees and all of the Homeowners who shall be named insurers under such policies, and with loss proceeds payable to the Trustees hereunder (or to one of the Trustees designated by them as the Insurance Trustee).

Section 6.5.1 — Certificate of Insurance. The Trustees will deliver certificates of insurance together with proof of payment of premiums to any Homeowner or mortgagee upon request.

Section 6.5.2 — Liability Insurance. The Trust shall maintain a comprehensive general liability insurance policy covering all Trust Property and facilities and any other areas that are under its supervision or that may be used in the maintenance repair or restoration of the Trust Property. The policy shall provide coverage for bodily injury and property damage in amounts to be determined from time to time in the sole, reasonable judgment of the Trustees.

(a) The liability insurance shall provide coverage for:

(i) Bodily injury and property damage that results from the operation, maintenance or use of the Trust Property.

(ii) Legal liability that results from lawsuits related to employment contracts in which the Trust is a party.

(iii) Severability of interest clause.

(iv) Thirty (30) days written notice of cancellation to the named insured and first mortgagees.

(b) Trustees shall maintain workers compensation and employers liability insurance for any employee of the Trust and may obtain other coverages as the Trustees in their discretion deem it appropriate.

(c) All such insurance shall be in such amounts and forms as the Trustees shall, in their discretion, deem necessary considering availability and mortgage requirements.

Section 6.5.3 — Insurance, a Common Expense. The cost of the insurance purchased pursuant to this Trust shall be a Trust Expense assessable and payable as provided herein.

Section 6.6.1 — Meetings of Trustees. The Trustees shall meet annually on the date of the annual meeting of the Homeowners and at such meeting may elect a Chairperson, Treasurer, Secretary and any other officers they deem expedient. Other meetings may be called by any Trustee and in such other manner as the Trustees may establish; provided, however, that written notice of each meeting stating the place, day and hour thereof shall be given at least two days before such meeting to each Trustee. A majority of the Trustees then in office shall constitute a quorum at all meetings. Such meetings shall be conducted in accordance with such rules as the Trustees may adopt.

Section 6.6.2 — Meetings of Homeowners. There shall be an annual meeting of the Homeowners on the third Tuesday in October in each year at eight o'clock p.m. (8:00 p.m.) at such reasonable place as may be designated by the Trustees by written notice given by the Trustees to the Homeowners at least seven (7) days prior to the date so designated. Special meetings (including a meeting in lieu of a passed annual meeting) of the Homeowners may be called at any time by the Trustees and shall be called by them upon the written request of Homeowners entitled to more than fifty (50%) percent of the beneficial interest in the Trust. Written notice of any special meeting, designating the place, day and hour thereof, shall be given by the Trustees to the Homeowners at least (7) days prior to the date so designated.

Section 6.6.3 — Notice of Certain Matters: Quorum: Majority Vote. Whenever at any meeting the Trustees propose to submit to the Homeowners any matter with respect to which specific approval of, or action by, the Homeowners is required by law or this Trust, the notice of such meeting shall so state and reasonably specify such matter. Homeowners entitled to more than thirty-three (33%) percent of the beneficial interest of this Trust either in person or by written proxy shall constitute a quorum at all meetings. Any action voted at a meeting shall require a majority of those voting and the vote of more than thirty-three (33%) percent of the beneficial interest in the Trust.

Section 6.7 — Restriction on Use Trust Property. A majority of the Trustees then in office may, by an instrument in writing and in accordance with the provisions of the Declaration of Trust, adopt such rules and regulations from time to time as they may determine to be necessary or appropriate to ensure that the Trust Property is used for the purposes set forth in this Declaration of Trust.

Section 6.8 — Notices to Homeowners. Every notice to any Homeowner required under the provisions of this Trust which may be deemed by the Trustees necessary or desirable in connection with the execution of the Trust created hereby or which may be ordered in any judicial proceeding shall be deemed sufficient and binding if in writing addressed to the Owner of such Home last appearing on the Trustees' records, and mailed, first class mail, postage prepaid, to such person at his address last appearing on the Trustees' records if other than the Home or, if no address other than the Home appears on the Trustees' records, mailed or delivered to the Home at least seven (7) days prior to the date fixed for the happening of the matter, thing or event of which such notice is given. The Owner or Owners of such Home shall have the responsibility of providing the Trustees with the correct name of the present Owners of the Home and any address other than the Home to which they desire notices to be mailed as to which matters the Trustees shall have no duty of inquiring beyond their records. Such a correction received by the Trustees shall not affect the validity of any notice previously sent by the Trustees in accordance with this agreement.

Section 6.9 — Inspection of Books: Reports to Homeowners. Books, accounts and records of the Trustees shall be open to inspection to any one or more of the Trustees and the Homeowner and first mortgagee of any Home at all reasonable times. The Trustees shall, as soon as reasonably possible after the close of each fiscal year, or more often if convenient to them, submit to the Homeowners a written report of the operations of the Trust for such year, which report shall include without limitation a statement of all receipts and expenditures and shall include financial statements, in such summary form and in only such detail as the Trustees shall deem proper. Any person who has been furnished with such report and shall have failed to object thereto by notice in writing to the Trustees given by registered mail within a period of one (1) month of the date of his or her receipt of the report shall be deemed to have assented thereto.

Section 6.10 — Checks, Notes, Drafts and Other Instruments. Checks, notes, drafts and other instruments for the payment of money drawn or endorsed in the names of the Trustees or of the Trust may be signed by any one Trustee or by any person or persons to whom such power may at any time or from time to time have been delegated by not less than a majority of the Trustees.

Section 6.11 — Fiscal Year. The fiscal year of the Trust shall be the year ending with the 31st day of December or such other date as may from time to time be determined by the Trustees.

ARTICLE VII

SALES AND MORTGAGES OF HOMES

Section 7.1 — No Severance of Ownership. The beneficial interest of each Homeowner in the Trust shall be an appurtenant interest, and no Homeowner shall execute any deed, mortgage, or other instrument conveying or mortgaging title to his Home without including therein the interest of such Homeowner in the Trust Property and assets of the Trust. Any such deed, mortgage, or other instrument purporting to affect any such interests, shall be deemed and taken to include the interest or interests so omitted, even though the latter shall not be expressly mentioned or described therein. No part of the Trust Property of any Home may be sold, transferred or otherwise disposed of, except as part of a sale, transfer or other disposition of the Home to which such interests are appurtenant.

ARTICLE VIII

RIGHTS AND OBLIGATIONS OF THIRD PARTIES

DEALING WITH THE TRUSTEES

Section 8.1 — Reliance on Identity of Trustees. No purchaser, mortgagee, lender or other person dealing with the Trustees as they then appear on record in the Registry of Deeds shall be bound to ascertain or inquire further as to the persons who are then Trustees under this Trust, or be affected by any notice, implied or actual, otherwise than by a certificate thereof duly recorded or registered, and such record or certificate shall be conclusive evidence of the personnel of the Trustees and of any changes therein and of their authority to act. The receipts of the Trustees, or any one or more of them, for moneys or things paid or delivered to them or him shall be effectual discharges therefrom to the persons paying or delivering the same and no person from whom the Trustees, or any one or more of them, shall receive any money, property or other credit shall be required to see to the application thereof. No purchaser, mortgagee, lender or other person dealing with the Trustees or with any real or personal property which then is or formerly was Trust Property shall be bound to ascertain or inquire as to the existence or occurrence of any event or purpose in or for which a sale, mortgage, pledge or charge is herein authorized or directed, or otherwise as to the purpose or regularity of any of the acts of the Trustees, and any instrument of appointment of a new Trustee or resignation or removal of an old Trustee purporting to be executed by the Trustees, Homeowners or other persons required by this Trust to execute the same, shall be conclusive in favor of any such purchaser or other person dealing with the Trustees of the matters therein recited relating to such discharge, resignation, removal or appointment or the occurrence thereof.

Section 8.2 — Personal Liability Excluded. No recourse shall at any time be had under or upon any note, bond, contract, order, instrument, certificate, undertaking, obligation, covenant or agreement, whether oral or written, made, issued or executed by the Trustees or by any agent or employee of the Trustees, or by reason of anything done or omitted to be done by or on behalf of them or any of them, against the Trustees individually, or against any such agent or employee, or against any beneficiary, either directly or indirectly, by legal or equitable proceedings, or by virtue of any suit or otherwise, and all persons extending credit to, contracting with or having any claim against the Trustees shall look only to the Trust Property for any debt, damage, judgment or decree, or for any money that may be otherwise become due or payable to them from the Trustees, so that neither the Trustees nor the beneficiaries, present or future, shall be personally liable thereof; provided, however, that nothing herein contained shall be deemed to limit or impair the liability of Homeowners under the provisions of this Trust. Notwithstanding the foregoing, the Trustees shall be liable for their actions of willful misconduct and/or gross negligence.

Section 8.3 — All Obligations Subject to This Trust. Every note, bond, contract, order, instrument, certificate, undertaking, obligation, covenant or agreement, whether oral or written, made, issued or executed by the Trustees, or by any agent or employee of the Trustees, shall be deemed to have been entered into subject to the terms, conditions, provisions and restrictions of this Trust, whether or not express reference shall have been made to this instrument.

**SECTION XII: MODEL HOMEOWNERS MAINTENANCE TRUST**

Section 8.4 — Further Matters of Reliance. This Declaration of Trust and any amendments to this Trust and any certificate required by the terms of this Trust to be recorded and any other certificate or paper signed by the Trustees or any of them which it may be deemed desirable to record shall be recorded with the Worcester Registry of Deeds and such record shall be deemed conclusive evidence of the contents and effectiveness thereof according to the tenor thereof; and all persons dealing in any manner whatsoever with the Trustees, the Trust Property or any beneficiary thereunder shall be held to have notice of any alteration or amendment of this Declaration of Trust, or change of Trustee or Trustees, when the same shall be recorded with said Registry of Deeds. Any certificate signed by the Trustees in office at the time (only one Trustee if there is only one at the time), setting forth as facts any matters affecting the Trust, including statements as to who are the beneficiaries, as to what action has been taken by the beneficiaries and as to matters determining the authority of the Trustees, or any of them to do any act, when duly acknowledged and recorded with said Registry of Deeds shall be conclusive evidence as to the existence of such alleged facts in favor of all third persons, including the Trustees, acting in reliance thereon. Any certificate executed by any Trustee hereunder, or by a majority of the Trustees hereunder, setting forth the existence of any facts, the existence of which is necessary to authorize the execution of any instrument or the taking of any action by such Trustee or majority, as the case may be, shall, as to all person acting in good faith in reliance thereon be conclusive evidence of the truth of the statements made in such certificate, the existence of the truth of the statements made in such certificate, the existence of the facts therein set forth and the existence of the authority of such one or more Trustees to execute and deliver the designated instrument on behalf of the Trust.

ARTICLE IX

AMENDMENTS AND TERMINATION

Section 9.1 — Amendments. The Trustees, with the consent in writing of Homeowners entitled to not less than seventy-five (75%) percent of the beneficial interest in this Trust, may at any time and from time to time amend, alter, add to, or change this Declaration of Trust in any manner or to any extent, the Trustees first, however, being duly indemnified to their reasonable satisfaction against outstanding obligations and liabilities; provided always, however, that no such amendment, alteration, addition or change (a) which purports to alter in any manner or to any extent modify or affect the percentage of the beneficial interest hereunder of any Homeowner would be altered or in any manner or to any extent whatsoever modified or affected, so as to be different from the percentage of the individual interest of such Homeowner in the Trust Property as set forth herein without the consent of 100% of the Homeowners, or (b) which would render this Trust contrary to or inconsistent with any requirements or provisions of applicable law or any permit or approval issued by a board or officer of the Town of West Boylston, or (c) which would alter, amend or revoke the obligations of the Trustees as set forth in Section 6.2 and 6.4.5 hereof or reduce the Buyer's obligation to pay a capital reserve amount as set forth in Section 6.3.1 hereof without the approval of the Planning Board of the Town of West Boylston shall be valid or effective. Any amendment, alteration, addition or change pursuant to the foregoing provisions of this paragraph shall become effective upon the recording with said Registry of Deeds of an instrument of amendment, alteration, addition, or change as the case may be, signed, sealed and acknowledged in the manner required in Massachusetts for the acknowledgement of deeds by a majority of the Trustees, if there be at least three then in office (or one Trustee if there be only one in office), setting forth in full the amendment, alteration, addition or change, and reciting the consent of the Homeowners required by the Trust to consent thereto. Such instrument, so executed and recorded, shall be conclusive evidence of the existence of all facts and of compliance with all prerequisites to the validity of such amendment, alteration, addition or change whether stated in such instrument or not, upon all questions as to title or affecting the rights of third persons and for all other purposes. Nothing in this paragraph shall be construed as making it obligatory upon the Trustees to amend, alter, add to or change the Declaration of Trust upon obtaining the necessary consent as hereinbefore provided.

Section 9.2 — Termination. The Trust hereby created shall terminate only upon the approval of the Planning Board of the Town of West Boylston. The powers of sale and all other powers herein given the Trustees shall continue as to all property at any time remaining in their hands or ownership, even though all times herein fixed for distributions of Trust Property may have passed.

ARTICLE X

MISCELLANEOUS PROVISIONS

Section 10.1 – Working Capital Fund. To insure that the Trust will have the funds to meet unforeseen expenditures or to purchase any additional equipment or services, the Sponsor may at its sole and exclusive discretion establish a working capital fund commencing with the sale of the first Home. Any amounts paid into this fund shall not be considered as advance payments or regular assessments. If deemed necessary by the Sponsor, each Home's share of the working capital fund shall be collected from the Homeowner at the time the Home is sold by the Sponsor.

Section 10.2 – Maintenance and Operation. The Trustees shall establish and maintain an adequate reserve fund for the periodic maintenance, repair and replacement of improvements to the Trust Property that it is obligated to maintain. The fund shall be maintained out of regular assessments for Trust Expense.

Section 10.3 – Homeowner's Right and Restrictions. Each Homeowner shall become a beneficiary of the Trust and shall be subject to all the rights and duties assigned to Homeowners under this Trust. So long as there are Homes in subdivision which have not been conveyed to the first purchaser, the Sponsor also shall enjoy these rights and responsibilities as they relate to each individual unsold Home.

Section 10.4 – Limitations of Ability to Sell. The Trustees shall not in any way restrict the Homeowner's right to sell, transfer or convey his Home. The Homeowner shall be obligated at the time of transfer to obtain a certificate signed by the Trustees evidencing that all Trust expenses and maintenance costs applicable to the Homeowner are current.

Section 10.5 – Restrictions of Mortgaging Homes. There shall be no restrictions on the Homeowner's right to mortgage his Home. The Homeowner shall be obligated at the time of mortgaging to obtain a certificate signed by the Trustees evidencing that all Trust expenses and maintenance costs applicable to the Homeowner are current.

Section 10.6. In the event repairs, maintenance or replacement of any Trust Property is required, and if after forty-eight (48) hours' written notice from the Town of West Boylston to take action relating thereto, the Trustees fail or are unable to take such action, the Town of West Boylston is authorized to direct the management company, if one exists, to perform the necessary work. If there is no management company under contract with the Trust, or if the management company refuses to perform the work, the Town of West Boylston may take such actions necessary to have the work performed, and the expenses thereof shall be chargeable against the working capital fund established pursuant to Section 6.3 of this Trust.

The rights hereby granted to the Town of West Boylston include the right to enforce the obligations of the Trustees contained herein by appropriate legal proceedings and to obtain injunctive and other equitable relief against any violation, including, without limitation, relief requiring repair, maintenance or replacement of any Trust Property (it being agreed that the Town has no adequate remedy at law), and shall be in addition to, and not in limitation of, any other rights and remedies available to the Town of West Boylston. The Town of West Boylston shall have the option to enforce said obligations, but does not have the obligation to do so. The Town of West Boylston does not undertake any liability or obligation relating to the condition of costs and expenses (including without limitation counsel fees and disbursements) incurred by the Town in enforcing the obligations of the Trustees herein or in remedying or abating any violation thereof.

Section 10.7. Notwithstanding anything in this Trust, any First Mortgagee who obtains title to a lot by Foreclosure or pursuant to any other remedies provided in its mortgage or by law shall not be liable for such lot's unpaid common expenses or dues which accrued prior to the acquisition of title to such lot by such First Mortgagee.

ARTICLE XI

CONSTRUCTION AND INTERPRETATION

In the construction hereof, whether or not so expressed, words used in the singular or in the plural respectively include individuals, firms, associations, companies (joint stock or otherwise), trusts and corporations unless a contrary intention is reasonably required by the subject matter or context. The title headings of difference parts hereof are inserted only for convenience or reference and are not to be taken to be any part hereof or to control or affect the meaning, construction, interpretation or effect hereof. All the trusts, powers and provisions herein contained shall take effect and be construed according to the laws of the Commonwealth of Massachusetts.

It is expressly understood and agreed that the terms, conditions, rights and obligations as set forth in this Declaration of Trust shall be covenants running with the land; shall be binding on all lots as shown on the Subdivision Plan as defined herein in Section 3.9; and shall be binding on all lot owners, their heirs, successors and assigns.

EXECUTED on the day and year first above written.

{Name}

\_\_\_\_\_  
{Sponsor}, {Title} {Company} and individually and as Trustee of the {Trust Name}

COMMONWEALTH OF MASSACHUSETTS

Worcester, ss

On this \_\_\_\_ day of \_\_\_\_\_ 2006, before me, the undersigned notary public, personally appeared {Name}, {Title} of {Company}, proved to me through satisfactory evidence of identification, which was/were [ ] Mass. driver's license(s) or [ ] \_\_\_\_\_, to be the person(s) whose name(s) is/are signed on the preceding or attached document and acknowledged to me that he/she/they signed it voluntarily for its stated purpose.

\_\_\_\_\_  
Notary Public  
My commission expires:



## **SECTION XIII MODEL OPERATION AND MAINTENANCE PLAN**

The following Model Operation and Maintenance program is proposed to be tailored to each site by the applicant.

This Operation and Maintenance Plan is intended to ensure the continued effectiveness of the structural water quality controls for the subdivision.

- Inspect stormwater basins once annually, in the spring, for cracking or erosion of side slopes, embankments, and accumulated sediment. Necessary sediment removal, earth repair, and/or reseeded will be performed immediately upon identification.
- Inspect sediment traps/forebays monthly for erosion of side slopes and accumulated sediment. Necessary sediment removal, earth repair and/or reseeded shall be performed immediately upon identification. Clean traps/ forebays approximately four times per year or as needed.
- Inspect water quality swales semi-annually; swales should be mowed once per year. Sediment and debris should be removed, at a minimum, once per year.
- Clean all catch basins twice annually to remove accumulated sand, sediment, and floatable products or as needed based on use.
- Paved areas will be swept, at a minimum, twice (2 times) per year.
- Routinely pick up and remove litter from the parking areas, islands and perimeter landscape areas in addition to regular pavement sweeping.
- Routinely inspect all dumpster and compactor locations for spills. Remove all trash litter from the enclosure and dispose of properly.

### **Construction Site Erosion and Sedimentation Control Techniques**

The following recommended erosion and sedimentation controls will be employed during the earthwork and construction phases of the project. The following controls are provided as recommendations for the site contractor and do not constitute or replace the final Stormwater Pollution Prevention Plan that must be implemented by the Contractor in Compliance with EPA NPDES regulations.

#### **Hay Bale Barriers**

Hay bale barriers are not a filter, they slow the water to allow solids to settle and will be placed to trap sediment transported by runoff before it reaches the drainage system or leaves the construction site. Bales will be set at least four inches into the existing ground to minimize undercutting by runoff.

### **Silt Fencing**

In areas where high runoff velocities or high sediment loads are expected, hay bale barriers will be backed up with silt fencing. This semi permeable barrier made of a synthetic porous fabric will provide additional protection. The silt fences and hay bale barrier will be replaced as determined by periodic field inspections.

### **Catch Basin Protection**

Newly constructed and existing catch basins will be protected with hay bale barriers (where appropriate) or silt sacks throughout construction. Water is to be directed into the basins during construction to minimize erosion and washout in the roadway. Appropriate collection areas are required at the outlets.

### **Construction Entrance/Exit**

A temporary crushed-stone construction entrance/exit will be constructed. A cross slope will be placed in the entrance to direct runoff to a protected catch basin inlet or settling area. If deemed necessary after construction begins, a wash pad may be included to wash off vehicle wheels before leaving the project site.

### **Diversion Channels**

Diversion channels will be used to collect runoff from construction areas and discharge to either sedimentation basins or protected catch basin inlets.

### **Temporary Sediment Basins**

Temporary sediment basins will be designed either as excavations or bermed stormwater detention structures (depending on grading) that will retain runoff for a sufficient period of time to allow suspended soil particles to settle out prior to discharge. These temporary basins will be located based on construction needs as determined by the contractor and outlet devices will be designed to control velocity and sediment. Points of discharge from sediment basins will be stabilized to minimize erosion.

### **Vegetative Slope Stabilization**

Stabilization of open soil surfaces will be implemented within 14 days after grading or construction activities have temporarily or permanently ceased, unless there is sufficient snow cover to prohibit implementation. Vegetative slope stabilization will be used to minimize erosion on slopes of 3:1 or flatter. Annual grasses, such as annual rye, will be used to ensure rapid germination and production of rootmass. Permanent stabilization will be completed with the planting of perennial grasses or legumes. Establishment of temporary and permanent vegetative cover may be established by hydro seeding or sodding. A suitable topsoil, good seedbed preparation, and adequate lime, fertilizer and water will be provided for effective establishment of these vegetative stabilization methods. Mulch will also be used after permanent seeding to protect soil from the impact of falling rain and to increase the capacity of the soil to absorb water.

### **Maintenance**

- The contractor or subcontractor will be responsible for implementing each control shown on the Sedimentation and Erosion Control Plan. In accordance with EPA regulations, the contractor must sign a copy of a certification to verify that a plan has been prepared and that permit regulations are understood.
- The on site contractor will inspect all sediment and erosion control structures periodically and after each rainfall event. Records of the inspections will be prepared and maintained on site by the contractor.

- Silt shall be removed from behind barriers if greater than 6 inches deep or as needed.
- Damaged or deteriorated items will be repaired immediately after identification.
- The underside of hay bales should be kept in close contact with the earth and reset as necessary.
- Sediment that is collected in structures shall be disposed of properly and covered if stored on site.
- Erosion control structures shall remain in place until all disturbed earth has been securely stabilized. After removal of structures, disturbed areas shall be regraded and stabilized as necessary.

**SECTION XIV MODEL CONVEYANCE OF EASEMENTS AND UTILITIES**

CONVEYANCE OF EASEMENTS AND UTILITIES

          [NAME OF GRANTOR], having an address of           [ADDRESS OF GRANTOR]  
, GRANTS to the TOWN OF WEST BOYLSTON, a Massachusetts municipal corporation, having an address  
of 120 Prescott Street, West Boylston, Massachusetts, with quitclaim covenants, the following rights and  
easements:

1. The perpetual rights and easements to construct, inspect, repair, remove, replace, operate and forever maintain (1) a sanitary sewer or sewers with any manholes, pipes, conduits and other appurtenances, (2) pipes, conduits and their appurtenances for the conveyance of water, and (3) a covered surface and ground water drain or drains with any manholes, pipes, conduits and their appurtenances, and to do all other acts incidental to the foregoing, including the right to pass along and over the land for the aforesaid purposes, in, through and under the land area within           [NAME OF STREET] as shown on the plan titled "          [TITLE OF PLAN]" dated           [DATE OF PLAN], prepared by           [NAME OF SURVEYOR OR ENGINEER], recorded or filed with the           [NAME OF REGISTRY, PLAN REFERENCE] or recorded or filed herewith, [and as particularly described in Exhibit A hereto].
2. The perpetual rights and easements to use           [NAME OF STREET], as described in Paragraph 1 hereof, for all purposes for which public ways are used in the Town of West Boylston.
3. [IF DRAINAGE EASEMENTS NEED TO BE GRANTED: The perpetual rights and easements for the purposes of drainage in, along, and upon an area shown as "          " on the above-mentioned plan. The Town shall have the right to drain water onto said area from time to time for all purposes and uses incidental to the discharge of storm water, including, but not limited to, the construction, maintenance and repair of the drainage facilities and all necessary appurtenances and to construct, inspect, repair, remove, replace, operate, and forever maintain or abandon in place.]

The Grantor warrants that the aforesaid easements are free and clear of all liens or encumbrances, that it has good title to transfer the same, that it will defend the same against claims of all persons and that this is not a conveyance of all or substantially all of the assets of the Grantor.

For Grantor's title see deed dated           , recorded with Worcester South District Registry of Deeds in Book           , Page           , or filed with Worcester South Registry District of the Land Court as Document No.           .

This conveyance is not to be effective until           [NAME OF STREET] is accepted by vote of West Boylston Town Meeting as indicated by the recording of a copy of the vote certified by the Town Clerk, at which time this easement will become effective as of the date hereof.

By signing below, the Grantor hereby for myself/ourselves and my/our successors and assigns, pursuant to G.L. c.79, §7A, waives, releases and forever discharges the Town of West Boylston, its successors and assigns, from all debt, demands, actions, reckonings, bonds, covenants, contracts,

SECTION XIV: MODEL CONVEYANCE OF EASEMENTS AND UTILITIES

agreements, promises, damages, and liabilities and any and all other claims of every kind, nature and description whatsoever, both in Law and Equity, from or in consequences of the taking of the easements described in this instrument, should the Town of West Boylston decide to take such easements by eminent domain, and hereby waives an appraisal of damages for said taking and consents to said taking under G.L. c.79, §5B.

Executed as a sealed instrument this \_\_\_\_ day of \_\_\_\_\_, 200\_\_.

GRANTOR:

By: \_\_\_\_\_

Name:

Title:

THE COMMONWEALTH/STATE OF \_\_\_\_\_

\_\_\_\_\_, ss

On this \_\_\_\_ day of \_\_\_\_\_, 200\_\_, before me, the undersigned notary public, personally appeared the above-named \_\_\_\_\_, who proved to me through satisfactory evidence of identification, which was a \_\_\_\_\_, to be the person whose name is signed on the above signature line of the attached document, and acknowledged to me that he/she signed it voluntarily for its stated purpose.

\_\_\_\_\_  
Notary Public

My Commission Expires: \_\_\_\_\_

ACCEPTANCE OF EASEMENT

The Town of West Boylston, acting by and through its Board of Selectmen pursuant to the vote taken under Article \_\_\_\_\_ of the \_\_\_\_\_ Town Meeting, a certified copy of which is attached hereto, G.L. c. 82, §§ 21-24, and any other authority in any way appertaining, hereby accepts the Conveyance of Easements and Utilities recorded with the Worcester County Registry of Deeds in Book \_\_\_\_\_, Page \_\_\_\_\_, or recorded herewith, on this \_\_\_\_\_ day of \_\_\_\_\_, 200\_\_.

TOWN OF WEST BOYLSTON,  
by its Board of Selectmen

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

COMMONWEALTH OF MASSACHUSETTS

Worcester, ss

On this \_\_\_\_ day of \_\_\_\_\_, 200\_\_, before me, the undersigned Notary Public, personally appeared \_\_\_\_\_, Selectman of the Town of West Boylston, as aforesaid, who proved to me through satisfactory evidence of identification, which were \_\_\_\_\_, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he/she signed it voluntarily for its stated purpose on behalf of the Town of West Boylston.

\_\_\_\_\_  
Notary Public  
My Commission Expires

SUBORDINATION OF MORTGAGE

\_\_\_\_\_, having an address of \_\_\_\_\_  
the present holder of a mortgage from \_\_\_\_\_, dated \_\_\_\_\_, \_\_\_\_\_, recorded with the  
Worcester South District Registry of Deeds in Book \_\_\_\_\_, Page \_\_\_\_\_, or filed with the Worcester Registry  
District of the Land Court as Document No. \_\_\_\_\_, for consideration of \$1.00 paid, the receipt and  
sufficiency of which is hereby acknowledged, hereby subordinates the lien of said mortgage to the  
easements granted to the Town of West Boylston by Conveyance of Easements and Utilities from \_\_\_\_\_  
, dated  
\_\_\_\_\_, \_\_\_\_\_, recorded with said Deeds in Book \_\_\_\_\_, Page \_\_\_\_\_, or recorded herewith, or filed with  
said Registry as Document No. \_\_\_\_\_, or filed herewith, as if said deed of easements had been recorded  
prior to said mortgage.

Executed under seal this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

By: \_\_\_\_\_  
Name:  
Its:

THE COMMONWEALTH/STATE OF \_\_\_\_\_

\_\_\_\_\_, ss

On this \_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_, before me, the undersigned notary public, personally  
appeared the above-named \_\_\_\_\_, who proved to me through satisfactory  
evidence of identification, which was a \_\_\_\_\_, to be the person whose name is signed  
on the above signature line of the attached document, and acknowledged to me that he/she signed it  
voluntarily for its stated purpose.

\_\_\_\_\_  
Notary Public  
My Commission Expires: \_\_\_\_\_

## APPENDIX J

### Standard Operating Procedures





Town of West Boylston  
Standard Operating Procedures  
Site Plan Review, Site Inspection and Enforcement Procedures

## 1.0 Introduction

Section 2.3.5 of the 2016 MS4 Permit requires permittees to develop a construction stormwater runoff control program, the objective of which is to minimize or eliminate erosion and sediment transport to waters of the US. This Standard Operating Procedure (SOP) outlines procedures for evaluating proposed and implemented stormwater controls on construction sites, satisfying the requirements of Section 2.3.5.c.ii: *Written procedures for site inspections and enforcement of erosion control measures* and Section 2.3.5.c.v: *Written procedures for site plan review, inspection and enforcement*. This document is intended to be used internally by municipal employees when conducting site plan application reviews, performing construction site inspections for the Town, or taking appropriate enforcement action.

## 2.0 Applicability and Responsibility

This SOP shall apply to the following:

- All stormwater management permit applications submitted to the West Boylston Stormwater Authority; all definitive plan submissions to the West Boylston Planning Board, all Site Plan Review applications to the Planning Board, and all Notice of Intentions (NOIs) submitted to the West Boylston Conservation Commission
- All projects or activities subject to the Applicability Section of the Town of West Boylston Stormwater Bylaw, including:
  - All new development and redevelopment projects including, but not limited to, site plan applications and subdivision applications, unless exempt under the Stormwater Bylaw.
  - Any activities that will result in an increased amount of stormwater runoff or pollutants from a parcel of land, or that will alter the drainage characteristics of a parcel of land, unless exempt under the Stormwater Bylaw.
  - An alteration, redevelopment, or conversion of land use to a hotspot (as determined by the Stormwater Authority) including, but not limited to, auto salvage yards, auto fueling facilities, fleet storage yards, commercial parking lots with high intensity use, road salt storage areas, commercial nurseries and

landscaping, outdoor storage and loading areas of hazardous substances, or marinas.

Implementation of this SOP is the responsibility of the West Boylston Stormwater Authority or its designees, including but not limited to the Planning Board, the Zoning Board of Appeals, the Earth Removal Board, the Conservation Commission, and the Building Inspector. The Stormwater Authority has the final authority to approve or deny project applications.

### 3.0 Procedures for Site Plan Reviews

#### 3.1 Controlling Erosion and Sedimentation Through Design and Planning

The Town of West Boylston Subdivision Rules and Regulations and Zoning Bylaws include standards for design of sediment and erosion controls. The following publications and policies should also be considered and will be incorporated into the Town's ordinances in the future:

- Massachusetts Storm Water Management Standards and Stormwater Handbook Volumes I and II, published by MassDEP and most recently updated in February 2008. *Stormwater Management Rules & Regulations, Section 6.2.*
- Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, published by the Massachusetts Department of Environmental Protection. *Stormwater Management Rules & Regulations, Section 6.5.*

Section 6.L of the Subdivision Rules and Regulations state that a separate Erosion and Sediment Control Plan should be submitted with the Definitive Plan including a description, phasing, and sequencing of construction activities, which specified the expected date of soil stabilization and completion, temporary and permanent soil erosion and sediment control measures, and temporary and permanent seeding and other vegetative controls. A Certified Professional in Erosion and Sediment Control or Registered Engineer must prepare the plans which may include:

- Detailed location, elevation, and cross-section of any dam or basin with drainage calculations to justify basin sizing;
- Plan view of any dam or basin;
- Spillway and outlet control designs showing calculations and profiles;
- Emergency spillway and outlet control designs showing calculations, profiles, and cross-sections;
- Runoff calculations for peak runoff during a 100-year storm;
- Notes and construction specifications;
- Type of device;
- Drainage area to any device;
- Volume of storage required;
- Outlet control mechanism details;

- Storage depth below an outlet or clean-out elevation;
- Embankment height, slope, cross-sections, and elevation;
- If required by the Planning Board, a portable safety fence may be required surrounding any basin or trap, not less than 42 inches in height with openings not more than three inches in diameter, firmly anchored at spacing no greater than eight feet. Detailed plans should be submitted where appropriate.

Vegetative stabilization measures required include:

- All perimeter dikes, slopes, basin or trap embankments will be stabilized with sod, hydroseed, and/or straw mulch (anchored on disturbed slopes greater than 15%), within 7 calendar days of disturbance. All other disturbed areas will be stabilized with sod, hydroseed, and/or straw mulch, (anchored on slopes greater than 15%), within 14 calendar days after disturbing activities have ceased
- The applicant shall submit a plan depicting where topsoil will be stripped from areas to be disturbed and stockpiled in an approved area and stabilized with temporary vegetative cover if left more than 21 calendar days. Perimeter sediment controls will be installed around stockpiled topsoil.
- During the months of October through March, when seeding and sodding may be impractical, an anchored mulch will be applied as approved by the Board.

During construction, catch basins must be provided and maintained with siltation controls to minimize the amount of silt that enters the drainage system.

Section 3.6.D of the Zoning Bylaws requires submittal of material as may be required to ensure the proposed development will not pollute surface or groundwater, cause soil erosion, increase runoff, change ground water levels, nor increase flooding during or after construction.

The Subdivision Rules and Regulations require that Low Impact Development (LID) practices are included in site design where possible. The Zoning Bylaws strongly encourage low impact development concepts and practices. The Stormwater Authority or its designee shall encourage the use of all LID objectives, such as reducing impervious cover and preserving greenspace and other natural areas.

These guidelines shall be applied and implemented by applicants during site design or shall be suggested by the reviewer prior to recommending the site for approval.

### *3.2 Site Plan Review Procedure*

The following procedure applies to projects eligible for a Stormwater Management Permit:

- Applicants will submit site plans to each of the following for pre-construction review:

- Planning Board
- Board of Health
- Police Department
- Sewer Department
- Water Department
- Building Inspector
- Conservation Commission
- Superintendent of Streets and Parks
- Director of Public Works
- Town Clerk
- Fire Department
- Review Engineer
- Municipal Lighting Plant

The following procedure applies to projects requiring a Stormwater Management Permit:

- The Stormwater Authority may take any of the following actions as a result of an application for a Stormwater Management Permit: Approval, Approval with Conditions, Disapproval, or Disapproval without Prejudice.
- A decision of the Stormwater Authority shall be final. Further relief of a decision by the Stormwater Authority made under this Bylaw shall be reviewable in the Superior Court in an action filed within sixty (60) days thereof, in accordance with M.G.L. Ch. 249 § 4.
- The Planning Board shall hold a public hearing within 65 days of its receipt of an application determined to be complete and shall take final action upon the site plan within 90 days from the time of the hearing with such conditions as it may deem appropriate and notify the applicant and other reviewing boards or departments of its decision. Written copies of the Planning Board’s action shall be certified and filed with the Town Clerk and sent by delivery or registered mail to the applicant.
- Failure of the Board to take final action upon an application within the time specified above shall be deemed to be approval of said application.
- Plan Changes and Extensions. Changes to an approved stormwater permit application must be approved in writing by the Planning Board.

### *3.3 Reporting*

The Stormwater Authority or its designee will track all site plan review submittals, stormwater permit applications, and NOI review submittals conducted by the various reviewing agencies. The number of reviews conducted each year must be included in the Town’s MS4 Annual Report, as submitted to EPA by September 28<sup>th</sup> each year.

## 4.0 Procedure for Site Inspection and Enforcement Actions

### 4.1 Site Inspection Procedure

The Stormwater Authority or its designee is responsible for conducting site inspections. The construction site owner or their agent is responsible for requesting inspections at the proper stage of construction. Each inspection shall be requested in writing at least 48 hours before the preferred date for such inspection. Construction stages that may require inspection include:

- Initial inspection of erosion and sedimentation controls and signage prior to any land disturbance to assess overall effectiveness for protecting resources;
- Inspection of the excavation for the stormwater management system to ensure adequate separation of the stormwater system from groundwater and presence of approved soil type;
- Inspection of the completed stormwater management system, prior to backfilling of any underground drainage or stormwater conveyance structures; and
- Final Inspection: After the stormwater management system has been constructed and before the surety has been released, the applicant must submit an as-built plan detailing the actual storm water management system as installed. The inspector(s) shall examine the system to confirm its “as-built” features. The inspector(s) shall also evaluate the effectiveness of the system in an actual storm.

The Stormwater Authority or their designee has the authority to make bi-weekly or monthly visits to active construction sites to check the status of erosion and sedimentation controls and ensure they are operating as intended. Inspections may also be conducted after incidents of heavy rainfall (0.25 inches or more in 24 hours). Each inspection should include the following:

- Review of the approved plan prior to visiting the site;
- Inspection of perimeter controls;
- Inspection of slopes and temporary stockpiles;
- Comparison of BMP and stockpile placement versus approved plan;
- Inspection of construction site entrances and exits;
- Inspection of temporary sedimentation basins, or other construction BMPs; and
- Inspection of discharge points and downstream, off-site areas.

Inspectors shall complete the Construction Site Inspection Report included in this SOP. The written report documenting compliance with the approved erosion and sedimentation controls shall be maintained by the developer and made available to the Town for review upon request.

### 4.2 Enforcement Action Procedure

The Stormwater Authority, or its designee, is responsible for enforcing the provisions of all approvals or conditions of approval for all Stormwater Management Permits. The Stormwater

Authority or its designee shall enforce the Stormwater Bylaw, regulations, orders, violation notices, and enforcement orders, and may pursue all civil and criminal remedies for such violations.

#### *4.3 Reporting*

The Town will track how many site inspections and enforcement actions are taken each year for on-going construction projects. This documentation will be included in the Town's MS4 Annual Report, as submitted to EPA by September 28<sup>th</sup> each year.

#### **5.0 Applicable Forms**

The following forms and checklists are included in this SOP and should be used as appropriate when conducting site plan reviews or site inspections:

- Construction Site Inspection Report with the Erosion and Sediment Control on Construction Sites Section, by the Central Massachusetts Regional Stormwater Coalition

## APPENDIX K

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: 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:  


The priority ranking will be completed during Permit Year 4. 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

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:

Due to limited resources and staff turnover, West Boylston has not been able to meet all of the Year 1 requirements of the MS4 Permit. The Town will distribute its required public education messages in future permit years. Mapping of stormwater infrastructure in West Boylston is incomplete, and efforts are being made to update and complete the mapping before developing a priority ranking or an IDDE Plan, all of which is planned for Permit Year 4. Additional mapping is needed in areas that were identified as regulated based on 2010 census data.

West Boylston's Rules and Regulations Governing the Subdivision of Land include written procedures for site plan review, erosion and sediment control, and site inspection requirements. West Boylston's Zoning Bylaw also includes language relating to site plan review, erosion and sediment control, and site inspections. The Town also has in place a Stormwater Management Bylaw that regulates new development and re-development projects and requires a Stormwater Management Permit for disturbances greater than 10,000 SF. However, these documents must be reviewed and/or adapted to ensure they meet the construction and post-construction stormwater runoff control requirements of the 2016 MS4 Permit.

West Boylston inspects and cleans their catch basins town-wide at least once annually. However, this information is not being logged and recorded unless problems are encountered. In Permit Year 4, the Town plans to develop an electronic catch basin cleaning data collection program. In the mean time, the Town plans to use paper forms to collect data for optimization planning during Permit Year 4 until this electronic data collection program can be developed and implemented.

Once their written SWMP is developed in Permit Year 4, the Town will provide an opportunity for the public to participated in implementation of the SWMP.

Mapping and inspection of stormwater treatment structures will also begin in Permit Year 4, along with municipal employee training on illicit discharge, detection, and elimination, and stormwater pollution prevention at municipal facilities.

### 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:

## 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: Social Media Outreach - Video**

Message Description and Distribution Method:

West Boylston participated in the Central Massachusetts Regional Stormwater Coalition (CMRSWC) in Year 1, which partnered with ThinkBlue MA to run an educational advertising campaign on social media. The campaign ran the "Fowl Water" advertisement through sponsored posts on Facebook and Instagram and as a YouTube pre-roll video.

Targeted Audience:

Responsible Department/Parties:

Measurable Goal(s):

The campaign received 1,738 impressions on Facebook and Instagram and 4,619 impressions on YouTube during Permit Year 1.

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:

The opportunity to participate in this ad campaign arose after the NOI was filed.

#### **BMP: Dear Resident Letter**

Message Description and Distribution Method:

The Town distributes an annual "Dear Resident" letter prior to Spring Town Meeting, notifying all residents of the meeting and sharing town announcements. The "Dear Resident" letter distributed during Permit Year 1 included a message reminding residents to pick up after their dog and that, when improperly disposed of, dog waste causes water pollution.

Targeted Audience:

Responsible Department/Parties:

Measurable Goal(s):

The letter was sent to every residence in West Boylston during Permit Year 1.

Message Date(s): Spring 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:

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:

As West Boylston did not complete its written SWMP during Year 1, no opportunity for public comment or involvement was provided. The Town will make the SWMP available for public comment and input in future permit years when the document is finalized.

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:

West Boylston provides many annual opportunities for public involvement and participation in implementation of the stormwater management program. The Town is part of the Wachusett Watershed Regional Recycling Center, which holds four hazardous waste collection days per year and is open to all residents. The Town holds an annual town-wide clean-up on Earth Day. This clean-up was held on April 17, 2019. West Boylston also continues to implement a "Pay-As-You Throw" initiative for household waste management while offering single-stream recycling, encouraging residents to recycle and reducing trash.

## 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:

Number of SSOs removed: 

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

West Boylston's MS4 map is mostly complete, however, some effort is needed to convert the mapping from CAD files and PDFs to a more useful GIS-based format. Some additional mapping of existing drainage infrastructure is also needed in select areas, especially in areas that were designated as urbanized based on 2010 census data.

### **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:

N/A

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

Number of illicit discharges identified:

Number of illicit discharges removed:

Estimated volume of sewage removed:  gallons

*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:

No employee IDDE training was conducted during Permit Year 1. The Town plans to begin conducting employee training after the IDDE plan is developed in Permit Year 4.

### **MCM4: Construction Site Stormwater Runoff Control**

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

Number of site plan reviews completed: 9

Number of inspections completed: 37

Number of enforcement actions taken: 0

## **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:

West Boylston's stormwater bylaw currently requires development projects to meet the requirements of the Massachusetts Stormwater Standards and Stormwater Handbook. This bylaw will be updated in future permit years to meet the additional requirements of the 2016 MS4 permit.

### **As-built Drawings**

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

West Boylston's Zoning Bylaw currently requires the submission of as-built plans prior to receiving a certificate of completion. This bylaw may be updated in future permit years to specifically require that the stormwater management system be shown on the as-built plan and to require an operation and maintenance plan for the stormwater management system.

### **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 will begin working on the street design and parking lots report during Permit Year 4.

### **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 will begin working on the green infrastructure report during Permit Year 4.



**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 will begin assembling the retrofit properties inventory during Permit Year 4.

**MCM6: Good Housekeeping****Catch Basin Cleaning**

Describe the status of the catch basin cleaning optimization plan:

While the Town does not have a written catch basin cleaning optimization plan in place, the Town cleans approx

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

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

N/A

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

Number of catch basins inspected:

Number of catch basins cleaned:

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

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

Total number of catch basins:

*If applicable:*

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

**Street Sweeping**

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

The Town is working to allocate funding to develop written procedures for sweeping streets and municipally-owned lots.

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

- Number of miles cleaned:
- Volume of material removed:  [UNITS]
- Weight of material removed:  [UNITS]

*If applicable:*

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

This plan will be developed as part of the planned development of the Town's written street sweeping procedures in Permit Year 4.

**Winter Road Maintenance**

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

The Town has written winter road maintenance procedures in place. No sand is used for winter road maintenance.

**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 working to develop the inventory of municipally-owned parks, open spaces, buildings, facilities, vehicles, and equipment.

**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 working to allocate funding to develop O&M Procedures for its parks and open spaces, buildings and facilities, and vehicles and equipment.

**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 in the process of allocating funding to develop SWPPPs for the DPW Facility and the Temple Street storage area.

*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 in the process of developing an inventory of municipally-owned stormwater treatment structures. This inventory will be used to develop written procedures for the operation and maintenance of stormwater treatment structures.

**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):

<https://www.mass.gov/doc/2018-wachusett-reservoir-watershed-water-quality-report/download>

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:

DCR has conducted sampling at outfalls located within West Boylston that are under their jurisdiction. This

data has been shared with the Town and has been provided to EPA/DEP as part of DCR's annual report. DCR also develops a yearly Water Quality Report for the Wachusett Reservoir. The 2018 report is available at the link above.

### **Additional Information**

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

### **Activities Planned for Next Reporting Period**

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

Yes, I agree

- 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:

## 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:  Title:

Signature:  Date:

*[Signatory may be a duly authorized representative]*

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

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

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

**Part I: Contact Information**

Name of Municipality or Organization: West Boylston

EPA NPDES Permit Number: MAR041171

**Primary MS4 Program Manager Contact Information**

Name: Gary Kellaher Title: Director of Public Works

Street Address Line 1: 35 Worcester Street

Street Address Line 2:

City: West Boylston State: MA Zip Code: 01583

Email: Phone Number: (508) 835-4820

**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:

West Boylston is working to allocate funding to develop their SWMP during FY22. It will be posted to the Town's website once it is completed. It will be complete by June 30, 2022, and reflect permit requirements through the end of Year 4.

## Part II: Self-Assessment

First, in the box below, select the impairment(s) and/or TMDL(s) that are applicable to your MS4. Make sure you are referring to the most recent EPA approved Section 303(d) Impaired Waters List which can be found here: <https://www.epa.gov/tmdl/region-1-impaired-waters-and-303d-lists-state>

<b>Impairment(s)</b>			
<input checked="" type="checkbox"/> Bacteria/Pathogens	<input type="checkbox"/> Chloride	<input type="checkbox"/> Nitrogen	<input type="checkbox"/> Phosphorus
<input type="checkbox"/> Solids/ Oil/ Grease (Hydrocarbons)/ Metals			
<b>TMDL(s)</b>			
<i>In State:</i>	<input type="checkbox"/> Assabet River Phosphorus	<input type="checkbox"/> Bacteria and Pathogen	<input type="checkbox"/> Cape Cod Nitrogen
	<input type="checkbox"/> Charles River Watershed Phosphorus	<input type="checkbox"/> Lake and Pond Phosphorus	
<i>Out of State:</i>	<input type="checkbox"/> Bacteria/Pathogens	<input type="checkbox"/> Metals	<input type="checkbox"/> Nitrogen
			<input type="checkbox"/> 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 2 Requirements

- Completed Phase I of system mapping
- Developed a written catchment investigation procedure and added the procedure to the SWMP
- Developed written procedures to require the submission of as-built drawings and ensure the long term operation and maintenance of completed construction sites and added these procedures to the SWMP
- Enclosed or covered storage piles of salt or piles containing salt used for deicing or other purposes
- Developed written operations and maintenance procedures for parks and open space, buildings and facilities, and vehicles and equipment and added these procedures to the SWMP
- Developed an inventory of all permittee owned facilities in the categories of parks and open space, buildings and facilities, and vehicles and equipment and added this inventory to the SWMP
- Completed a written program for MS4 infrastructure maintenance to reduce the discharge of pollutants
  - Developed written SWPPPs, included in the SWMP, for all of the following permittee owned or operated facilities: maintenance garages, public works yards, transfer stations, and other waste handling facilities where pollutants are exposed to stormwater

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

COVID-19, staff turnover, and limited resources have impacted the Town's ability to complete many Year 2 requirements. While West Boylston has some of its drainage system mapped, further effort is required to bring the mapping into a workable GIS format and meet all of the Phase I requirements especially in areas that were



designated as urbanized based on 2010 census data. The IDDE plan, catchment investigation procedures, and IDDE training have not been completed, but are planned for Permit Year 4.

The Rules & Regulations Governing the Subdivision of Land in West Boylston and the West Boylston Zoning Bylaw include a requirement to submit as-built plans prior to receiving a certificate of completion for new development and redevelopment projects, however those regulatory mechanisms do not include provisions requiring the long-term operation and maintenance of stormwater management systems. West Boylston will update these regulatory mechanisms in Permit Year 4 to meet permit requirements.

The Town is currently developing an inventory of municipally owned parcels, vehicles, equipment, and stormwater treatment structures that will be used to develop written Operation and Maintenance Procedures. While the work could not be completed in Permit Year 2, efforts to complete this requirement are ongoing. Similarly, West Boylston recognizes the need to develop a SWPPP for its DPW facility, and the Temple Street Storage Facility. These SWPPPs will be developed during Permit Year 4.

### Annual Requirements

- Provided an opportunity for public participation in review and implementation of SWMP and complied with State Public Notice requirements
- Kept records relating to the permit available for 5 years and made available to the public
- The SSO inventory has been updated, including the status of mitigation and corrective measures implemented
  - This is not applicable because we do not have sanitary sewer
  - This is not applicable because we did not find any new SSOs
  - The updated SSO inventory is attached to the email submission
  - The updated SSO inventory can be found at the following website:
- Properly stored and disposed of catch basin cleanings and street sweepings so they did not discharge to receiving waters
- Provided training to employees involved in IDDE program within the reporting period
- All curbed roadways were swept at least once within the reporting period
- Updated outfall and interconnection inventory and priority ranking as needed

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

West Boylston was not able to complete its SWMP during Permit Year 2 for the same reasons many year 2 requirements were not met, discussed above. Since the SWMP and MS4 mapping are still in progress, and the IDDE plan has not yet been developed, no employee IDDE training was conducted during the reporting period and no updates were made to the outfall/interconnection inventory.

**Bacteria/ Pathogens** (Combination of Impaired Waters Requirements and TMDL Requirements as Applicable)

Annual Requirements

*Public Education and Outreach\**

- Annual message was distributed encouraging the proper management of pet waste, including noting any existing ordinances where appropriate
- Permittee or its agents disseminated educational material to dog owners at the time of issuance or renewal of dog license, or other appropriate time
- Provided 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)*

*Optional:* If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

An informational message about dog waste management was included on the "Dear Resident" letter sent to every residence ahead of Spring Town Meeting during Permit Year 2.

*Optional:* Use the box below to provide any additional information you would like to share as part of your self-assessment:

### Part III: Receiving Waters/Impaired Waters/TMDL

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

- Yes
- No

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

## Part IV: Minimum Control Measures

Please fill out all of the metrics below. If applicable, include in the description who completed the task if completed by a third party.

### MCM1: Public Education

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

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

#### **BMP: Brochure/Website**

Message Description and Distribution Method:

The Board of Health maintains a brochure on their website informing residents about dog waste and its impacts on surface water quality. The brochure was developed by DCR and focuses specially on pet waste management within DCR watershed lands.

Targeted Audience:

Responsible Department/Parties:

Measurable Goal(s):

The flyer has been available to the public for most of the permit term. It is posted on the Board of Health's website at this link: <https://www.westboylston-ma.gov/sites/g/files/vyh1f1421/f/uploads/wachdogwaste.pdf>

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: Social Media Outreach - Video**

Message Description and Distribution Method:

West Boylston participated in the Central Massachusetts Regional Stormwater Coalition (CMRSWC) in Year 2, which partnered with ThinkBlue MA to run an educational advertising campaign on social media. The campaign ran the "Fowl Water" advertisement through sponsored posts on Facebook and Instagram and as a YouTube pre-roll video.

Targeted Audience:

Responsible Department/Parties:

Measurable Goal(s):

The campaign received 8,160 impressions on Facebook and Instagram and 16,036 impressions on YouTube

during Permit Year 2.

Message Date(s): July 2019; May-June 2020

Message Completed for: Appendix F Requirements  Appendix H Requirements

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

If yes, describe why the change was made:

The opportunity to participate in this ad campaign arose after the NOI was filed.

### **BMP: Dear Resident Letter**

Message Description and Distribution Method:

The Town distributes an annual "Dear Resident" letter prior to Spring Town Meeting, notifying all residents of the meeting and sharing town announcements. The "Dear Resident" letter distributed during Permit Year 2 included a message reminding residents to pick up after their dog and that, when improperly disposed of, dog waste causes water pollution.

Targeted Audience: Residents

Responsible Department/Parties: Select Board

Measurable Goal(s):

The letter was sent to every residence in West Boylston during Permit Year 2.

Message Date(s): Spring 2020

Message Completed for: Appendix F Requirements  Appendix H Requirements

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

If yes, describe why the change was made:

Add an Educational Message

### **MCM2: Public Participation**

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

As West Boylston did not complete its written SWMP during Permit Year 2, no opportunity for public comment or involvement was provided. The Town will make the SWMP available for public comment and

input during Permit Year 4 and in future permit years as the document is developed and updated.

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

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

West Boylston provides many annual opportunities for public involvement and participation in implementation of its stormwater management program. The Town continued to be a part of the Wachusett Watershed Regional Recycling Center, which continued to operate and accept hazardous waste during the COVID-19 pandemic. The Town continued its "Pay-as-you-throw" initiative for household waste management and continued to offer single-stream recycling during Year 2. No organized waterway or earth day cleanups were held due to the impacts of COVID-19.

### **MCM3: Illicit Discharge Detection and Elimination (IDDE)**

#### **Sanitary Sewer Overflows (SSOs)**

*Check off the box below if the statement is true.*

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

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

Number of SSOs identified:

Number of SSOs removed:

#### **MS4 System Mapping**

*Below, check all that apply.*

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

- Outfalls and receiving waters
- Open channel conveyances
- Interconnections
- Municipally-owned stormwater treatment structures
- Waterbodies identified by name and indication of all use impairments
- Initial catchment delineations

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

West Boylston mapped its drainage infrastructure in certain areas of town in 2008 as part of an as-built survey for a sewer expansion project. The mapping that exists is comprehensive, however it is in CAD format and does not include the entire regulated area in West Boylston. The Town will update, expand, and convert its MS4 mapping into a more workable GIS format during Permit Year 4.

#### **Screening of Outfalls/Interconnections**

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

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

N/A

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

Number of outfalls screened:

**Catchment Investigations**

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

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

N/A

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

Number of catchment investigations completed this reporting period:

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

Percent of total catchments investigated:

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

**IDDE Progress**

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

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

N/A

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

Number of illicit discharges identified:

Number of illicit discharges removed:

Estimated volume of sewage removed:  gallons/day

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

Total number of illicit discharges identified:

Total number of illicit discharges removed:

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

N/A

### **Employee Training**

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

No employee training related to the MS4 Permit and/or Illicit Discharge Detection and Elimination was conducted during the reporting period.

### **MCM4: Construction Site Stormwater Runoff Control**

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

Number of site plan reviews completed:

Number of inspections completed:

Number of enforcement actions taken:

*Optional:* Enter any additional information relevant to construction site plan reviews, inspections, and enforcement actions:

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

#### **Ordinance or Regulatory Mechanism**



*Below, select the option that describes your ordinance or regulatory mechanism progress.*

- Bylaw, ordinance, or regulations are updated and adopted consistent with permit requirements
- Bylaw, ordinance, or regulations are updated consistent with permit requirements but are not yet adopted
- Bylaw, ordinance, or regulations have not been updated or adopted

**As-built Drawings**

Describe 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:

West Boylston's zoning bylaw currently requires the submission of as-built plans prior to receiving a certificate of completion. This bylaw may be updated in future permit years to specifically require that the stormwater management system be shown on the as-built plan, and to require the submission of an operation and maintenance plan for the stormwater management system. Supporting Rules & Regulations may also be developed to consolidate all of the Town's regulatory language relating stormwater management on new development and redevelopment parcels into one document.

**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 will begin working on the street design and parking lots report during Permit Year 4.

**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 will begin working on the green infrastructure report during Permit Year 4.

**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 will begin assembling the retrofit properties inventory during Permit Year 4.

**Catch Basin Cleaning**

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

Number of catch basins inspected:

Number of catch basins cleaned:

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

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

Total number of catch basins:

*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 plans to start collecting the required data to build their optimization plan in Permit Year 4. However, the Town does currently clean all catch basins town-wide annually.

**Street Sweeping**

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

Number of miles cleaned:

Volume of material removed:  [Select Units]

Weight of material removed:  [Select Units]

**O&M Procedures and Inventory of Permittee-Owned Properties**

*Below, check all that apply.*

The following permittee-owned properties have been inventoried:

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

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

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

**Stormwater Pollution Prevention Plan (SWPPP)**

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

Number of site inspections completed:

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

N/A

## **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:

DCR has conducted sampling at outfalls located within West Boylston that are under their jurisdiction. This data had been shared with the Town and has been provided to EPA/DEP as part of DCR's Year 2 annual report. DCR also develops a yearly Water Quality Report for Wachusett Reservoir. The 2019 report is available at the link above.

### **Additional Information**

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

### **COVID-19 Impacts**

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

COVID-19 strained already limited resources in West Boylston, preventing the Town from meeting many of its Year 2 and annual requirements. These impacts have been discussed above, and the Town is committed to

becoming compliant with all MS4 requirements as soon as practicable.

### **Activities Planned for Next Reporting Period**

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

Yes, I agree

- Inspect all outfalls/ interconnections (excluding Problem and Excluded outfalls) for the presence of dry weather flow
- Complete follow-up ranking as dry weather screening becomes available

### **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
- 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
- Continue investigations of catchments associated with Problem Outfalls
- Review inventory of all permittee owned facilities in the categories of parks and open space, buildings and facilities, and vehicles and equipment; update if necessary

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

## Part V: Certification of Small MS4 Annual Report 2020

### 40 CFR 144.32(d) Certification

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

Name:

Christopher Rucho

Title:

Chairman, Select Board

Signature:



Date:

9-5-21

*[Signatory may be a duly authorized representative]*

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

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

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

**Part I: Contact Information**

Name of Municipality or Organization: West Boylston

EPA NPDES Permit Number: MAR041171

**Primary MS4 Program Manager Contact Information**

Name: Kevin Duffy Title: Director of Public Works

Street Address Line 1: 35 Worcester Street

Street Address Line 2:

City: West Boylston State: MA Zip Code: 01583

Email: kduffy@westboylston-ma.gov Phone Number: 508-835-4820

**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:

West Boylston is working to allocate funding to develop their SWMP during FY22. It will be posted to the Town's website once it is completed. It will be complete by June 30, 2022, and reflect permit requirements through the end of Year 4.

## Part II: Self-Assessment

First, in the box below, select the impairment(s) and/or TMDL(s) that are applicable to your MS4. Make sure you are referring to the most recent EPA approved Section 303(d) Impaired Waters List which can be found here: <https://www.epa.gov/tmdl/region-1-impaired-waters-and-303d-lists-state>

<b>Impairment(s)</b>			
<input checked="" type="checkbox"/> Bacteria/Pathogens	<input type="checkbox"/> Chloride	<input type="checkbox"/> Nitrogen	<input type="checkbox"/> Phosphorus
<input type="checkbox"/> Solids/ Oil/ Grease (Hydrocarbons)/ Metals			
<b>TMDL(s)</b>			
<i>In State:</i>	<input type="checkbox"/> Assabet River Phosphorus	<input type="checkbox"/> Bacteria and Pathogen	<input type="checkbox"/> Cape Cod Nitrogen
	<input type="checkbox"/> Charles River Watershed Phosphorus	<input type="checkbox"/> Lake and Pond Phosphorus	
<i>Out of State:</i>	<input type="checkbox"/> Bacteria/Pathogens	<input type="checkbox"/> Metals	<input type="checkbox"/> Nitrogen
			<input type="checkbox"/> Phosphorus
			<input type="button" value="Clear Impairments and TMDLs"/>

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

### Year 3 Requirements

- Inspected and screened all outfalls/interconnections (excluding Problem and Excluded outfalls)
- Updated outfall/interconnection priority ranking based on the information collected during the dry weather inspections as necessary
- Post-construction bylaw, ordinance, or other regulatory mechanism was updated and adopted consistent with permit requirements

*Optional:* If you would like to describe progress made on any incomplete requirements listed above, provide any additional information, and/or if any of the above year 3 requirements could not be completed due to the impacts of COVID-19, please identify the requirement that could not be completed, any actions taken to attempt to complete the requirement, and reason the requirement could not be completed below:

COVID-19, staff turnover, and limited resources have impacted the Town's ability to complete many Year 3 requirements. The Town is working to bring the mapping of its drainage system into a workable GIS format, after which the Town will develop a preliminary outfall and interconnection priority ranking. The Town will then conduct dry weather outfall and interconnection screening and sampling during Permit Year 4. Once dry weather outfall/interconnection screening and sampling is completed in Year 4, the Town will update the outfall and interconnection priority ranking based on the collected data.

The Rules and Regulations Governing the Subdivision of Land in West Boylston and the West Boylston Zoning Bylaw include some requirements for post-construction stormwater management, including a requirement to submit drainage calculations to demonstrate compliance with the MA Stormwater Standards, however those regulatory mechanisms do not set specific pollutant removal requirements for BMPs that are outlined in the MS4 Permit. The Town also currently has a stormwater bylaw embedded in the Town's General Bylaws that gives the Town the authority to develop supporting Rules & Regulations, which may be

developed to consolidate all of the Town's regulatory language relating to stormwater management for new development and redevelopment into one document. West Boylston will review and update these regulatory mechanisms in Permit Year 4 as needed to meet permit requirements.

### Annual Requirements

- Provided an opportunity for public participation in review and implementation of SWMP and complied with State Public Notice requirements
- Kept records relating to the permit available for 5 years and made available to the public
- The SSO inventory has been updated, including the status of mitigation and corrective measures implemented
  - This is not applicable because we do not have sanitary sewer
  - This is not applicable because we did not find any new SSOs
  - The updated SSO inventory is attached to the email submission
  - The updated SSO inventory can be found at the following website:
- Properly stored and disposed of catch basin cleanings and street sweepings so they did not discharge to receiving waters
- Provided training to employees involved in IDDE program within the reporting period
- All curbed roadways were swept at least once within the reporting period
- Updated system map due in year 2 as necessary
- Enclosed all road salt storage piles or facilities and implemented winter road maintenance procedures to minimize the use of road salt
- Implemented SWPPPs for all permittee owned or operated maintenance garages, public works yards, transfer stations, and other waste handling facilities
- Updated inventory of all permittee owned facilities as necessary
- O&M programs for all permittee owned facilities have been completed and updated as necessary
- Implemented all maintenance procedures for permittee owned facilities in accordance with O&M programs
- Implemented program for MS4 infrastructure maintenance to reduce the discharge of pollutants
- Inspected all permittee owned treatment structures (excluding catch basins)

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

The Town was not able to complete its SWMP, IDDE Plan, O&M Program, or SWPPPs for applicable facilities in Permit Year 3 due to COVID-19, staff turnover, and limited resources. No employee IDDE or SWPPP training was held during Permit Year 3. However, the Town has recently allocated funds to these efforts and hired a consultant to assist, and will work to accomplish these tasks during Permit Year 4.

**Bacteria/ Pathogens** (Combination of Impaired Waters Requirements and TMDL Requirements as Applicable)



Annual Requirements

*Public Education and Outreach\**

- Annual message was distributed encouraging the proper management of pet waste, including noting any existing ordinances where appropriate
- Permittee or its agents disseminated educational material to dog owners at the time of issuance or renewal of dog license, or other appropriate time
- Provided 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)*

*Optional:* If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

An informational message about dog waste management was included on the "Dear Resident" letter sent to every residence ahead of Spring Town Meeting during Permit Year 3.

*Optional:* Use the box below to provide any additional information you would like to share as part of your self-assessment:

### Part III: Receiving Waters/Impaired Waters/TMDL

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

Yes

No

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

## Part IV: Minimum Control Measures

Please fill out all of the metrics below. If applicable, include in the description who completed the task if completed by a third party.

### MCM1: Public Education

Number of educational messages completed during this reporting period: 3

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

#### **BMP: Brochure/Website**

Message Description and Distribution Method:

The Board of Health maintains a brochure on their website informing residents about dog waste and its impacts on surface water quality. The brochure was developed by DCR and focuses specifically on pet waste management within DCR watershed lands. The flyer can be found at this link: <https://www.westboylston-ma.gov/sites/g/files/vyh1f1421/f/uploads/wachdogwaste.pdf>

Targeted Audience: Residents

Responsible Department/Parties: Board of Health

Measurable Goal(s):

The flyer was available to the public for the entirety of Permit Year 3. The exact number of times the flyer was viewed is unknown.

Message Date(s): FY2021

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: Dear Resident Letter**

Message Description and Distribution Method:

The Town distributes an annual "Dear Resident" letter prior to Spring Town Meeting, notifying residents of the meeting and sharing town announcements. The "Dear Resident" letter distributed during Permit Year 3 included a message reminding residents to pick up after their dog and that, when improperly disposed of, dog waste contributes to water pollution.

Targeted Audience: Residents

Responsible Department/Parties: Select Board

Measurable Goal(s):

The letter was sent to every residence in West Boylston during Permit Year 3.

Message Date(s): Spring 2021

Message Completed for: Appendix F Requirements  Appendix H Requirements

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

If yes, describe why the change was made:

**BMP: Social Media Outreach - Video**

Message Description and Distribution Method:

West Boylston participated in the Central Massachusetts Regional Stormwater Coalition (CMRSWC) in Year 3, which partnered with ThinkBlue MA to run an educational advertising campaign on social media. The campaign ran the "Fowl Water" advertisement through sponsored posts on Facebook and Instagram and as a YouTube pre-roll video.

Targeted Audience: Residents

Responsible Department/Parties: Public Works

Measurable Goal(s):

The campaign received 3,391 impressions on Facebook and Instagram, 8,426 impressions on YouTube and 1,434 Spanish Language impressions during Permit Year 3.

Message Date(s): May 17 to June 4, 2021

Message Completed for: Appendix F Requirements  Appendix H Requirements

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

If yes, describe why the change was made:

The opportunity to participate in this ad campaign arose after the NOI was filed.

Add an Educational Message

## MCM2: Public Participation

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

As West Boylston did not complete its written SWMP during Permit Year 3, no opportunity for public comment or involvement was provided. The Town will make the SWMP available for public comment and input during Permit Year 4 and in future permit years as the document is developed and updated.

The Town held a public meeting on June 30, 2021 with the Select Board to discuss the status of the Town's compliance with the MS4 Permit, and next steps to bring the Town into compliance with the permit by the end of Permit Year 4.

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

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

The Town provides various opportunities for public involvement and participation in implementation of its stormwater management program. The Town continued to be a part of the Wachusett Watershed Regional Recycling Center, which accepts hazardous waste on a continual basis. The Town continued its "Pay as you throw" initiative for household waste management and continued to offer single-stream recycling during Year 3. No organized waterway or earth day cleanups were held due to the ongoing impacts of COVID-19.

## MCM3: Illicit Discharge Detection and Elimination (IDDE)

### Sanitary Sewer Overflows (SSOs)

Check off the box below if the statement is true.

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

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

Number of SSOs identified:

Number of SSOs removed:

### MS4 System Mapping

*Optional:* Provide additional status information regarding your map:

The Town mapped its drainage infrastructure in certain areas of town in 2008 as part of an as-built survey for a sewer expansion project. The mapping that exists is comprehensive, however it is in CAD format and does not include the entire regulated area in West Boylston. The Town will update, expand, and convert its MS4

mapping into a more workable GIS format during Permit Year 4.

**Screening of Outfalls/Interconnections**

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

- No outfalls were inspected
- The outfall screening data is attached to the email submission
- The outfall screening data can be found at the following website:

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

Number of outfalls screened:

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

Percent of outfalls screened:

*Optional: Provide additional information regarding your outfall/interconnection screening:*

The Town will complete its dry weather outfall and interconnection screening during Permit Year 4.

**Catchment Investigations**

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

- No catchment investigations were conducted
- The catchment investigation data is attached to the email submission
- The catchment investigation data can be found at the following website:

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

Number of catchment investigations completed this reporting period:

*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.

- No illicit discharges were found
- The illicit discharge removal report is attached to the email submission
- The illicit discharge removal report can be found at the following website:

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

Number of illicit discharges identified:

Number of illicit discharges removed:

Estimated volume of sewage removed:  gallons/day

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

Total number of illicit discharges identified:

Total number of illicit discharges removed:

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

**Employee Training**

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

No employee training relating to the MS4 Permit and/or Illicit Discharge Detection and Elimination was conducted during the reporting period.

**MCM4: Construction Site Stormwater Runoff Control**

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

Number of site plan reviews completed:

Number of inspections completed:

Number of enforcement actions taken:

*Optional:* Enter any additional information relevant to construction site plan reviews, inspections, and enforcement actions:

The West Boylston Planning Board, with assistance from a consultant, conducted site inspections and stormwater management permit monitoring at 7 sites that are either subdivisions or site plan developments. DCR conducted 28 additional site inspections for 2 development projects in West Boylston during the reporting period: the subdivision extension at 29 Westland Circle and the development at 20 Holt Street.

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

#### **As-built Drawings**

*Below, report on the number of as-built drawings received during this reporting period.*

Number of as-built drawings received:

*Optional:* Enter any additional information relevant to the submission of as-built drawings:

#### **Street Design and Parking Lots Report**

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

The Town will begin working on the street design and parking lots report during Permit Year 4.

#### **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 will begin working on the green infrastructure report during Permit Year 4.

#### **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 will begin assembling the retrofit properties inventory during Permit Year 4.

### MCM6: Good Housekeeping

#### Catch Basin Cleaning

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

Number of catch basins inspected: 800

Number of catch basins cleaned: 800

Total volume or mass of material removed from all catch basins: 600 cubic yards

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

Total number of catch basins: 800

*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 plans to start collecting the required data to build their catch basin cleaning optimization plan in Permit Year 4 to establish the frequency of cleaning needed to ensure that no catch basin sump is ever more than 50% full. The Town currently cleans all catch basins town-wide annually, and will make adjustments to their cleaning schedule as needed once the catch basin cleaning optimization plan has been developed.

#### Street Sweeping

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

Number of miles cleaned: 50

Volume of material removed: [ ] [Select Units]

Weight of material removed: [ ] [Select Units]

#### Stormwater Pollution Prevention Plan (SWPPP)

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

Number of site inspections completed: 0

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

N/A

### 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:

In previous permit years, DCR has conducted sampling at outfalls located within West Boylston that are under their jurisdiction. This effort, as well as ongoing monthly in-stream monitoring, continued during the reporting period, however no data has been shared with West Boylston or posted on DCR's website.

#### 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:

Through its participation in the Central Massachusetts Regional Stormwater Coalition, West Boylston has collaborated with DCR to address certain MS4 Permit requirements. As mentioned under MCM1, West Boylston has utilized materials developed by DCR in its public education efforts. DCR continues to conduct water quality monitoring in West Boylston-- monthly monitoring in Year 3 was conducted at 8 locations in 7 streams. DCR also assisted the Town in conducting construction inspections of two developments-- the subdivision extension at 29 Westland Circle and the Lenkarski development at 20 Holt Street-- to ensure compliance with the sites' Construction General Permits. There were 28 total inspections, including 7 wet-weather inspections, conducted at those sites during the reporting period.

#### COVID-19 Impacts

*Optional:* If any of the above year 3 requirements could not be completed due to the impacts of COVID-19, please identify the requirement that could not be completed, any actions taken to attempt to complete the requirement, and reason the requirement could not be completed below:

COVID-19 continued to strain already limited resources in West Boylston during Permit Year 3, preventing

the Town from meeting many permit requirements. These impacts have been discussed above and the Town is committed to coming into compliance with the MS4 Permit as soon as practicable. The Town has recently secured funding and has retained the services of an outside consultant to assist the Town in coming into compliance with the permit requirements.

### Activities Planned for Next Reporting Period

Please confirm that your SWMP has been, or will be, updated to comply with all applicable permit requirements including but not limited to the year 4 requirements summarized below. (Note: impaired waters and TMDL requirements are not listed below)

Yes, I agree

- Develop a report assessing current street design and parking lot guidelines and other local requirements within the municipality that affect the creation of impervious cover
- Develop a report assessing existing local regulations to determine the feasibility of making green infrastructure practices allowable when appropriate site conditions exist
- Identify a minimum of 5 permittee-owned properties that could potentially be modified or retrofitted with BMPs to reduce impervious areas

### Annual Requirements

- Annual report submitted and available to the public
- Annual opportunity for public participation in review and implementation of SWMP
- Keep records relating to the permit available for 5 years and make available to the public
- Properly store and dispose of catch basin cleanings and street sweepings so they do not discharge to receiving waters
- Annual training to employees involved in IDDE program
- Update inventory of all known locations where SSOs have discharged to the MS4
- 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 curbed streets at least annually
- Continue investigations of catchments associated with Problem Outfalls
- Implemented SWPPPs for all permittee owned or operated maintenance garages, public works yards, transfer stations, and other waste handling facilities
- Review inventory of all permittee owned facilities in the categories of parks and open space, buildings and facilities, and vehicles and equipment; update if necessary
- Review O&M programs for all permittee owned facilities; update if necessary
- Implement all maintenance procedures for permittee owned facilities in accordance with O&M programs
- Implement program for MS4 infrastructure maintenance to reduce the discharge of pollutants
- Enclose all road salt storage piles or facilities and implemented winter road maintenance procedures to minimize the use of road salt
- Review as-built drawings for new and redevelopment to ensure compliance with post construction

- bylaws, regulations, or regulatory mechanism consistent with permit requirements
- Inspect all permittee owned treatment structures (excluding catch basins)

Provide any additional details on activities planned for permit year 4 below:

## Part V: Certification of Small MS4 Annual Report 2021

### 40 CFR 144.32(d) Certification

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

Name:

Christopher Rucho

Title:

Chairman, Select Board

Signature:



Date:

9-29-21

*[Signatory may be a duly authorized representative]*

**Year 4 Annual Report**  
**Massachusetts Small MS4 General Permit**  
**Reporting Period: July 1, 2021-June 30, 2022**

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

*Unless otherwise noted, all fields are required to be filled out. If a field is left blank, it will be assumed the requirement or task has not been completed. Please ONLY report on activities between July 1, 2021 and June 30, 2022 unless otherwise requested.*

**Part I: Contact Information**

Name of Municipality or Organization:

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:

**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:

### Part II: Self-Assessment

First, in the box below, select the impairment(s) and/or TMDL(s) that are applicable to your MS4. Make sure you are referring to the most recent EPA approved Section 303(d) Impaired Waters List which can be found here: <https://www.epa.gov/tmdl/region-1-impaired-waters-and-303d-lists-state>

<b>Impairment(s)</b>			
<input checked="" type="checkbox"/> Bacteria/Pathogens	<input checked="" type="checkbox"/> Chloride	<input type="checkbox"/> Nitrogen	<input type="checkbox"/> Phosphorus
<input type="checkbox"/> Solids/ Oil/ Grease (Hydrocarbons)/ Metals			
<b>TMDL(s)</b>			
<i>In State:</i>	<input type="checkbox"/> Assabet River Phosphorus	<input type="checkbox"/> Bacteria and Pathogen	<input type="checkbox"/> Cape Cod Nitrogen
	<input type="checkbox"/> Charles River Watershed Phosphorus	<input type="checkbox"/> Lake and Pond Phosphorus	
<i>Out of State:</i>	<input type="checkbox"/> Bacteria/Pathogens	<input type="checkbox"/> Metals	<input type="checkbox"/> Nitrogen
			<input type="checkbox"/> Phosphorus
			<input type="button" value="Clear Impairments and TMDLs"/>

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

#### Year 4 Requirements

Developed a report assessing current street design and parking lot guidelines and other local requirements within the municipality that affect the creation of impervious cover, made it available as part of the SWMP, and:

- No updates were recommended
- Updates were recommended. The anticipated date or date of completion for updates is/was:

June 2024

Developed a report assessing local regulations to determine the feasibility of making green infrastructure practices allowable when appropriate site conditions exist, made it available as part of the SWMP, and:

- No updates were recommended
- Updates were recommended. The anticipated date or date of completion for updates is/was:

June 2024

Identified a minimum of 5 permittee-owned properties that could potentially be modified or retrofitted with BMPs to reduce impervious cover

*Optional:* If you would like to describe progress made on any incomplete requirements listed above, provide an update on previous incomplete milestones, or provide any additional details, please use the box below:

Annual Requirements

- Provided an opportunity for public participation in review and implementation of SWMP and complied with State Public Notice requirements
- Kept records relating to the permit available for 5 years and made available to the public
- The SSO inventory has been updated, including the status of mitigation and corrective measures implemented
  - This is not applicable because we do not have sanitary sewer
  - This is not applicable because we did not find any new SSOs
  - The updated SSO inventory is attached to the email submission
  - The updated SSO inventory can be found at the following website:
- Updated system map due in year 2 as necessary
- Provided training to employees involved in IDDE program within the reporting period
- Properly stored and disposed of catch basin cleanings and street sweepings so they did not discharge to receiving waters
- All curbed roadways were swept at least once within the reporting period
- Enclosed all road salt storage piles or facilities and implemented winter road maintenance procedures to minimize the use of road salt
- Implemented SWPPPs for all permittee owned or operated maintenance garages, public works yards, transfer stations, and other waste handling facilities
- Updated inventory of all permittee owned facilities as necessary
- O&M programs for all permittee owned facilities have been completed and updated as necessary
- Implemented all maintenance procedures for permittee owned facilities in accordance with O&M programs
- Implemented program for MS4 infrastructure maintenance to reduce the discharge of pollutants
- Inspected all permittee owned treatment structures (excluding catch basins)

*Optional:* If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

The Town secured a grant to build a permanent structure to contain the salt and sand pile available for residential use at the DPW facility. This structure was recently built and the residential salt and sand pile is now covered as of July 2022.

The Town has inspected and mapped all known BMPs that are municipally-owned.

**Bacteria/ Pathogens** (Combination of Impaired Waters Requirements and TMDL Requirements as Applicable)Annual Requirements*Public Education and Outreach\**

- Annual message was distributed encouraging the proper management of pet waste, including noting any existing ordinances where appropriate



- Permittee or its agents disseminated educational material to dog owners at the time of issuance or renewal of dog license, or other appropriate time
  - Provided 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)*

*Optional:* If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

An informational message about dog waste management was included in the "Dear Resident" letter sent to every residence ahead of Spring Town Meeting during Permit Year 4. Educational material was also linked to the Town's Dog Licensing Page on the Town's website, and included with dog license renewal applications.

**Chloride**

- Completed the Salt Reduction Plan due in Year 3, updated if necessary
  - The Salt Reduction Plan is attached to the email submission
  - The Salt Reduction Plan can be found at the following website:

Annual Requirements

*Public Education and Outreach*

- Included an annual message in November/ December to private road salt applicators and commercial
- industrial site owners on the proper storage and application rates of winter deicing material, along with the steps that can be taken to minimize salt use and protect local waterbodies

*Please fill out the following information on salt usage over Year 4 of the permit. Be sure to include units for amount of salt:*

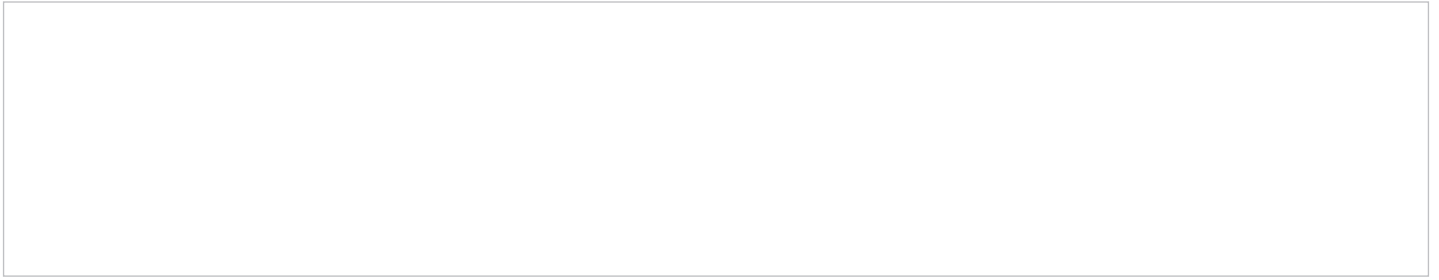
Type(s) of salt applied:

Amount of salt applied:

*Optional:* If you would like to describe progress made on any incomplete requirements listed above or provide any additional details, please use the box below:

A number of chloride impairments were newly designated for receiving waters in West Boylston on the Final Massachusetts Integrated List of Waters for the Clean Water Act 2018/2020 Reporting Cycle, which is dated November 2021. These include Gates Brook (MA81-24), Scarletts Brook (MA81-25), and two (2) unnamed tributaries to the Wachusett Reservoir (MA81-49 and MA81-54). The Town has 3 years from the date that these receiving waters were identified as impaired to develop a Chloride Reduction Plan, and five years to implement the plan.

*Optional:* Use the box below to provide any additional information you would like to share as part of your self-assessment:



### Part III: Receiving Waters/Impaired Waters/TMDL

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

- Yes  
 No

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

Receiving waters, outfalls and impairments have been updated since the NOI was originally submitted. Please see the Town's Stormwater Management Plan included on the Town's website for an updated list of outfalls, receiving waters, and relevant impairments in West Boylston. A number of chloride impairments were newly identified for receiving waters in West Boylston on the Final Massachusetts Integrated List of Waters for the Clean Water Act 2018/2020 Reporting Cycle, which is dated November 2021. These include Gates Brook (MA81-24), Scarletts Brook (MA81-25), and two (2) unnamed tributaries to the Wachusett Reservoir (MA81-49 and MA81-54). It was also brought to the Town's attention that the Town may be subject to the requirements of the MS4 Permit as they relate to the Phosphorus TMDL for Lake Quinsigamond, as the Town does have urbanized area within the lake's watershed. However, the 2016 MS4 Permit does not identify the Town as being subject to the requirements of this TMDL. The Town is currently awaiting guidance from the EPA.

## Part IV: Minimum Control Measures

Please fill out all of the metrics below. If applicable, include in the description who completed the task if completed by a third party.

### MCM1: Public Education

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

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

#### **BMP: Social Media Outreach - Video**

Message Description and Distribution Method:

Distribute educational materials to residents through social media. The Massachusetts Think Blue Video was shared on social media.

Targeted Audience:

Responsible Department/Parties:

Measurable Goal(s):

Think Blue Massachusetts led a social media advertising campaign using the Think Blue Video. Facebook and Google provided the Central MA Regional Stormwater Coalition with ad impressions for Facebook, Instagram and YouTube for the region served by the coalition. During Permit Year 4, 5,071 people viewed this video on Facebook and Instagram. Ad impressions attributed to West Boylston include 6,614 views on YouTube.

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: Brochures/ Pamphlets**

Message Description and Distribution Method:

Materials about proper pet waste disposal and how the public can impact stormwater and receiving water quality were distributed.

Targeted Audience:

Responsible Department/Parties:

Measurable Goal(s):

A pet waste notice was posted at the Town Clerk's Office, attached to dog license applications and was posted on the Town's Website. There were 559 dog licenses provided.

Separately, the Town also included an informational message about dog waste management in the "Dear Resident" letter sent to every residence ahead of Spring Town Meeting during Permit Year 4.

Message Date(s): Permit Year 4

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: Brochures/Pamphlets**

Message Description and Distribution Method:

Information about West Boylston's stormwater management program targeting residents and how they can impact stormwater and receiving water quality is sent out in the Fall Town Meeting Notice.

Targeted Audience: Residents

Responsible Department/Parties: DPW / Town Admin

Measurable Goal(s):

Approximately 3,500 Town Meeting notices were distributed this permit year.

Message Date(s): Permit Year 4

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: Brochures/Pamphlets**

Message Description and Distribution Method:

Target groups likely to impact stormwater through lawn maintenance, building maintenance, de-icing materials being stored and used, and unswept parking lots when applicable using brochures.

Targeted Audience: Businesses, Institutions, and Commercial Facilities

Responsible Department/Parties: DPW

Measurable Goal(s):

Educational material was sent to all (3) gas stations in town on June 8, 2022.

Message Date(s): Permit Year 4

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: Brochures/Pamphlets**

Message Description and Distribution Method:

Enforce Stormwater Management Bylaw during and after construction. Make information available in the Building and Planning Departments.

Targeted Audience: Developers (construction)

Responsible Department/Parties: DPW; Building Permitting and Enforcement

Measurable Goal(s):

The Town made information regarding proper sediment and erosion controls aimed at developers available. Educational material was sent to 16 licensed drain layers in town.

Message Date(s): June 8, 2022

Message Completed for: Appendix F Requirements  Appendix H Requirements

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

If yes, describe why the change was made:

**BMP: Web Page**

Message Description and Distribution Method:

Place information on the Town's website about proper sediment and erosion control measures.

Targeted Audience: Developers (Construction)

Responsible Department/Parties: DPW

## Measurable Goal(s):

The Town placed informational material regarding proper sediment and erosion control aimed at developers on the Town's website. This information was viewed 131 times.

Message Date(s): Permit Year 4

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: :Brochures/Pamphlets**

## Message Description and Distribution Method:

Distribute educational materials about equipment inspection, waste disposal, dumpster maintenance, de-icing materials storage and use, and parking lot sweeping.

Targeted Audience: Industrial Facilities

Responsible Department/Parties: DPW, Building Department

## Measurable Goal(s):

The Town's DPW distributes brochures and maintains a list of all recipients. A flyer was posted at the Building Department for all applicants to view at the beginning of June. There were 34 building permits issued from then until the end of the permit year.

Message Date(s): Permit Year 4

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:Brochures/Pamphlets**

## Message Description and Distribution Method:

Distribute information to septic system owners about proper septic system maintenance.

Targeted Audience: Residents

Responsible Department/Parties: DPW, Board of Health

Measurable Goal(s):

A septic system maintenance letter was sent to owners of all properties connected to septic systems.

Message Date(s): Permit Year 4

Message Completed for: Appendix F Requirements  Appendix H Requirements

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

If yes, describe why the change was made:

---

Add an Educational Message

## MCM2: Public Participation

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

The Stormwater Management Plan was posted for public comment on the Town's website on June 30th and was made available for public comment through July 15th.

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

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

Public presentations were made to the Select Board by the DPW Director regarding the status of the Town's compliance with the 2016 MS4 Permit on December 15, 2021, and March 16, 2022. These meetings are public noticed and attended by the general public, and provide the public an opportunity to discuss components of the Town's stormwater management program. In addition, a town wide clean up was organized and held for residents on April 30, 2022. The Wachusett Recycling Center also offered special collection days for household hazardous waste on November 13, 2021 and April 23, 2022.

## MCM3: Illicit Discharge Detection and Elimination (IDDE)

### Sanitary Sewer Overflows (SSOs)

Check off the box below if the statement is true.

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



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

Number of SSOs identified:

Number of SSOs removed:

### **MS4 System Mapping**

*Optional:* Provide additional status information regarding your map:

During Permit Year 4, the Town mapped the portions of their drainage system within urbanized areas, including outfalls, drainage pipes, catch basins, drain manholes, interconnections and BMPs using both GPS technology and available record drawings to build the Town's drainage system in GIS. The Town also completed Phase 1 and Phase 2 mapping requirements, including delineation of catchment areas and mapping of impaired waters, in addition to those items previously mentioned. The drainage map will continue to be updated as necessary in future permit years based on field investigations. Drainage mapping will also be updated as a result of new development and redevelopment work on an as needed basis.

### **Screening of Outfalls/Interconnections**

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

- No outfalls were inspected
- The outfall screening data is attached to the email submission
- The outfall screening data can be found at the following website:

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

Number of outfalls screened:

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

Percent of outfalls screened:

*Optional:* Provide additional information regarding your outfall/interconnection screening:

The Town completed dry weather outfall and interconnection screening in Permit Year 4. The Town will begin wet weather outfall and interconnection screening and sampling during Permit Year 5, at those outfalls where at least one System Vulnerability Factor (SVF) was identified. The Town's SVF matrix is attached to this e-mail submission.

### **Catchment Investigations**

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

- No catchment investigations were conducted
- The catchment investigation data is attached to the email submission
- The catchment investigation data can be found at the following website:

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

Number of catchment investigations completed this reporting period:

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:

The Town does not have any problem catchment areas. The Town will begin catchment investigations in high priority catchments starting in Year 5. The Town developed their IDDE Plan during Permit Year 4 and also developed their Catchment Prioritization & Ranking Matrix, which is attached to the e-mail submission with this report. This matrix reflects findings from the dry weather outfall & interconnection screening and sampling effort completed this year.

### **IDDE Progress**

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

- No illicit discharges were found
- The illicit discharge removal report is attached to the email submission
- The illicit discharge removal report can be found at the following website:

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

Number of illicit discharges identified:

Number of illicit discharges removed:

Estimated volume of sewage removed:  gallons/day

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

Total number of illicit discharges identified:

Total number of illicit discharges removed:

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

Catchment Investigations will begin during Permit Year 5 in accordance with the Catchment Prioritization & Ranking Matrix developed during Permit Year 4.

**Employee Training**

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

West Boylston held an IDDE and SWPPP Training session on May 12, 2022. The training was attended by 5 municipal employees from the West Boylston Cemetery, DPW and Building Departments. The SWPPP training covered Best Management Practices at both the DPW Facility as well as the Mount Vernon Cemetery.

**MCM4: Construction Site Stormwater Runoff Control**

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

Number of site plan reviews completed:

Number of inspections completed:

Number of enforcement actions taken:

*Optional:* Enter any additional information relevant to construction site plan reviews, inspections, and enforcement actions:

**MCM5: Post-Construction Stormwater Management in New Development and Redevelopment****Ordinance or Regulatory Mechanism**

Date update was completed (due in year 3):

During Permit Year 4, the Town drafted updates to their existing Stormwater Management Bylaw, developed supporting Stormwater Management Rules & Regulations, and developed a separate Stormwater Bylaw that specifically covers use of the storm drain system. These local code updates are in the process of being reviewed internally. The Town recently hired a new Town Administrator, who they would like to engage in this process. The Town anticipates formally adopting these updates at Spring Town Meeting.

**As-built Drawings**

*Below, report on the number of as-built drawings received **during this reporting period.***

Number of as-built drawings received:

*Optional:* Enter any additional information relevant to the submission of as-built drawings:

**Retrofit Properties Inventory**

Below, list the permittee-owned properties that could be modified or retrofitted with BMPs to mitigate impervious areas (at least 5):

Site #1: Department of Public Works (35 Worcester Street)  
 Site #2: West Boston Municipal Light Plant ( 4 Crescent Street)  
 Site #3: Lee Street and Goodale Street Intersection  
 Site #4: Pride Park Playground (70 Crescent Street)  
 Site #5: Paul X Tivnan Drive Cemetery (Paul X Tivnan Drive)

Stormwater retrofits have not been completed at any of these sites to date.

**MCM6: Good Housekeeping****Catch Basin Cleaning**

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

Number of catch basins inspected:

Number of catch basins cleaned:

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

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

Total number of catch basins:

*If applicable:*

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

During Permit Year 4, the Town adopted an electronic catch basin cleaning data collection system to track how frequently catch basins were filling up. However, the Town began catch basin cleaning prior to the implementation of the electronic data collection form. The Town implemented and begin collecting data for

their Catch Basin Optimization Plan in April 2022 and cleaned and collected data for 178 catch basins. Prior to this, the town cleaned all other basins in Town during Permit Year 4 as they do every year. The total volume of material was calculated using the average volume per basin and applying the average to the total number of basins cleaned. West Boylston will continue to collect data for their Catch Basin Optimization Plan and implement the plan after two data points for each catch basin have been collected. It is anticipated that the plan will be implemented during Permit Year 7, once sufficient data has been collected.

### **Street Sweeping**

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

- Number of miles cleaned:
- Volume of material removed:  [Select Units]
- Weight of material removed:  [Select Units]

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

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

Number of site inspections completed:

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

The Town developed SWPPPs for the DPW Facility and the Mount Vernon Cemetery during Permit Year 4. The Town is working to correct a few items noted in the SWPPPs. At the DPW Garage, the Town is in the process of filing an insurance claim to repair the damage to the roof of their salt shed. Currently the roof is secured and covered with a temporary patch. Once funds become available, the salt shed will be permanently repaired. Construction of the improvements to the salt shed are anticipated to be completed in Permit Year 5. During the SWPPP inspection at the DPW Facility, the residential sand/salt mix pile was noted as being uncovered. Funding was secured to construct a permanent structure to contain and cover the sand/salt mix pile. Construction of this structure was completed in July 2022. Based on the timing of development of each SWPPP during Permit Year 4, only four (4) inspections were able to be completed - two (2) quarterly inspections were conducted at each facility.

## **Additional Information**

### **Monitoring or Study Results**

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

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

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

### **Additional Information**

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

During Permit Year 4, West Boylston was proactive in making every effort to come into compliance with the requirements of the 2016 MS4 Permit. The Town developed a written SWMP; developed a written IDDE Plan; reviewed and drafted updates to their existing stormwater management bylaw, and supplemented this bylaw as needed by drafting supporting rules and regulations to meet the construction and post-construction stormwater management requirements of the permit; developed a separate draft stormwater bylaw to specifically regulate use of the storm drain system; developed a comprehensive map of their storm drain system in GIS within the urbanized area portion of the town; conducted dry weather outfall/interconnection screening and sampling; performed a catchment prioritization and ranking; developed the System Vulnerability Factor Matrix to identify outfalls and interconnections for wet weather sampling; developed Stormwater Pollution Prevention Plans for the DPW Facility and the Mount Vernon Cemetery; developed an inventory of municipal facilities and property and developed a town-wide Operations & Maintenance Plan; inspected municipally-owned BMPs; developed and implemented an electronic catch basin cleaning inspection and tracking form; and developed the required Post-Construction Stormwater Management Reports. The Town will continue to work diligently during Permit Year 5 to become fully compliant.

### **COVID-19 Impacts**

*Optional:* If any of the above year 4 requirements could not be completed due to the impacts of COVID-19, please identify the requirement that could not be completed, any actions taken to attempt to complete the requirement, and reason the requirement could not be completed below:

### **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 5 requirements summarized below. (Note: impaired waters and TMDL requirements are not listed below)

Yes, I agree

#### **Annual Requirements**

- Annual report submitted and available to the public

- Annual opportunity for public participation in review and implementation of SWMP
- Keep records relating to the permit available for 5 years and make available to the public
- Properly store and dispose of catch basin cleanings and street sweepings so they do not discharge to receiving waters
- Annual training to employees involved in IDDE program
- Update inventory of all known locations where SSOs have discharged to the MS4
- 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 curbed streets at least annually
- Continue investigations of catchments associated with Problem Outfalls
- Implemented SWPPPs for all permittee owned or operated maintenance garages, public works yards, transfer stations, and other waste handling facilities
- Review inventory of all permittee owned facilities in the categories of parks and open space, buildings and facilities, and vehicles and equipment; update if necessary
- Review O&M programs for all permittee owned facilities; update if necessary
- Implement all maintenance procedures for permittee owned facilities in accordance with O&M programs
- Implement program for MS4 infrastructure maintenance to reduce the discharge of pollutants
- Enclose all road salt storage piles or facilities and implemented winter road maintenance procedures to minimize the use of road salt
- Review as-built drawings for new and redevelopment to ensure compliance with post construction bylaws, regulations, or regulatory mechanism consistent with permit requirements
- Inspect all permittee owned treatment structures (excluding catch basins)
- Identify additional permittee-owned properties that could potentially be modified or retrofitted with BMPs to reduce impervious areas so that the permittee maintains a minimum of 5 sites in their inventory, until such a time when the permittee has less than 5 sites remaining

Provide any additional details on activities planned for permit year 5 below:

During Permit Year 5 the Town is planning to complete the following work:

- Adopt recommended updates to local code to address MS4 Permit requirements and the local permitting process.
- Begin development of a Chloride Reduction Plan for those watersheds of receiving waters with chloride impairments.
- Begin Wet Weather Outfall & Interconnection Sampling
- Begin Catchment Investigations in High Priority Areas

## Part V: Certification of Small MS4 Annual Report 2021

### 40 CFR 144.32(d) Certification

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

Name:

Title:

Signature:

Date:

*[Signatory may be a duly authorized representative]*



## APPENDIX L

### Post-Construction Stormwater Management Reports:

BMP Retrofit Inventory Report

Street Design & Parking Lot Report

Green Infrastructure Report



westonandsampson.com

WESTON & SAMPSON ENGINEERS, INC.  
55 Walkers Brook Drive, Suite 100  
Reading, MA 01867  
tel: 978.532.1900

# REPORT

June 2022

TOWN OF

**West Boylston**

MASSACHUSETTS

Year 4 MS4 Permit Compliance

BMP Retrofit Inventory Report

DRAFT for Review

Town of West Boylston, Massachusetts MS4 Permit Compliance  
BMP Retrofit Inventory Report

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## 1.0 INTRODUCTION

### 1.1 Regulatory Requirement

The 2016 Massachusetts General Permit for Small Municipal Separate Storm Sewer Systems (MS4 Permit), which came into effect on July 1, 2018, regulates discharges from small MS4s to waters of the United States. The 2016 MS4 Permit was modified during 2020, and the modifications became effective on January 6, 2021. 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 must implement various Best Management Practices for each of the following six minimum control measures:

- Public Education and Outreach
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Stormwater Management in New Development and Redevelopment (Post-Construction Stormwater Management)
- Good Housekeeping and Pollution Prevention for Municipal Operations

As part of the minimum control measure for Post-Construction Stormwater Management, Section 2.3.6 of the 2016 MS4 Permit requires regulated communities to 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. These BMPs may include the reduction of impervious area or the implementation of structural stormwater treatment practices, like bioretention areas or infiltration trenches.

The purpose of this exercise is to develop an inventory of BMP retrofit projects that can be implemented in future permit years as opportunities present themselves, as part of planned capital improvements to storm and sanitary sewer infrastructure, as part of planned municipal facility/site improvements, or as part of road reconstruction projects. As BMP retrofit projects are completed, the Town of West Boylston shall continue to identify potential sites for BMP retrofit opportunities to maintain a backlog of projects.

## 2.0 PARCEL CONSIDERATIONS AND RANKING

Properties and infrastructure for consideration shall include those with the potential for reduction of on-site impervious area as well as those that could provide disconnection of off-site impervious area from the MS4. At a minimum, West Boylston 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 and disconnection of impervious cover.

The following factors were considered in determining the suitability of municipally-owned parcels for BMP retrofit: 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 a priority ranking, factors such as planned capital improvements, current storm sewer level of service, and control of discharges to areas of critical environmental concern such as water quality limited waters, first or second order streams, public swimming beaches, and drinking water supply sources were also considered, where applicable.

The following sections summarize the factors that were considered at each parcel when developing the list of BMP retrofit opportunities.

### 2.1 Impervious Area

Impervious area, or surfaces that do not allow stormwater to infiltrate into the ground, increase the amount of runoff directed to nearby water bodies. Rapid development and increased precipitation trends due to climate change mean that older systems may no longer be adequately sized to handle larger storm events. This can lead to localized stormwater flooding and property damage. Disconnection of impervious surfaces will promote stormwater infiltration through the use of structural BMPs and reduce the likelihood of stormwater flooding. BMPs improve water quality in receiving waters by removing pollutants from stormwater runoff before it is discharged.

Municipally-owned properties with large amounts of impervious surface provide ample opportunity for BMP retrofits. However, municipally-owned parcels that are mostly pervious may provide an opportunity for the Town to disconnect adjacent drainage systems and install BMPs to provide treatment and infiltration in the vacant area within a particular property. All municipally-owned properties should be considered for potential retrofit opportunities.

## 2.2 Soil and Groundwater Data

Structural BMPs and green infrastructure require certain soil properties to achieve efficient and effective water quality treatment. A low groundwater table, a large unsaturated thickness<sup>1</sup>, and soils within hydraulic soil groups A and B provide the most optimal conditions for stormwater treatment and infiltration. Although these conditions are not required, suboptimal conditions may require added cost for the design and construction of a BMP retrofit if site conditions need to be altered prior to installation.

Data from the United States Department of Agriculture (USDA) web soil survey was retrieved to obtain soil conditions at each of the potential sites. Unsaturated thickness was taken from the Massachusetts Department of Environmental Protection (MassDEP) Well Drilling Database for West Boylston.

## 2.3 Proximity to Aquifers and Subsurface Infrastructure

Parcels that are nearby aquifers and storm and sanitary sewer networks provide good opportunities for BMP retrofits. Stormwater treatment will help improve the water quality of nearby aquifers while promoting groundwater recharge. Proximity to drainage infrastructure is important when selecting sites for BMP retrofit. Parcels with on-site drainage or that have adjacent storm drains provide easier disconnection of drainage (and impervious surface runoff) to treat stormwater. This will be more cost effective to the Town, as it is less labor-intensive than extending a current drainage system to the parcel where a BMP is being constructed.

Approximately 90% of West Boylston is on sanitary sewer. A majority of the areas served by the Town sewer also have drainage infrastructure. West Boylston has a comprehensive sewer and drainage Geographic Information System (GIS) showing known outfalls, receiving waters, as well as sanitary sewer and storm drain manholes, catch basins, pipes, and drainage best management practices. The West Boylston Water District provides drinking water for the Town derived from three gravel packed wells located off Lee Street, Thomas Street, and Temple Street, and four related storage facilities. The Aquifer and Watershed Protection Overlay District Bylaw adopted by the Town serves to prohibit landfilling of wastewater and septage residuals and to limit expansion of impervious surface on existing non-residential land. The Aquifer and Watershed Protection District is superimposed on the Town's Zoning Map.

## 2.4 Opportunity for Public Education

Stormwater management practices, especially green infrastructure and surface treatment structures, are more effective when the public is educated and informed. Public outreach and engagement are critical components in the Town's stormwater management program, both in informing residents of the ways they can reduce stormwater pollution and in generating buy-in towards stormwater improvement projects. The MS4 Permit public education and outreach minimum control measure requires the Town to make education information available to the public and other stakeholders.

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<sup>1</sup> Portion of soil above the water table.

Structural BMPs provide an opportunity for the Town to exemplify the educational information the Town has been distributing to the public. A BMP in a highly exposed area, such as a Town office building or a popular park, can help spread awareness about stormwater management and water quality in receiving waters by demonstrating some of the physical mechanisms used in stormwater systems. The Town can also use interpretive signage at the BMP location to provide a more interactive opportunity for public education and engagement.

## 2.5 Planned Capital Improvement Projects

Municipally-owned properties that are part of or in the vicinity of planned capital improvement projects provide excellent opportunities for BMP retrofit. Incorporating BMP retrofits is easier and more cost effective in areas where roadway, storm drain, and/or sanitary sewer infrastructure is already under construction.

West Boylston has a Capital Investment Board (CIB) that is comprised of seven voters, of which at least four are members of the Town's Finance Committee. The Town also has a Facilities Implementation & Strategic Planning Committee comprised of eleven individuals, five of which are town residents, five of which are members of the Board of Selectmen, and one of which is a member of the Finance Committee or Capital Investment Board. The following projects are planned or proposed on municipally-owned properties in West Boylston:

- The Town has plans to improve the parking lot at the DPW, and to implement stormwater best management practices or green infrastructure in the design. The parking lot serves employees and visitors of the Public Works Department and is used for storage and maintenance of municipal vehicles and equipment.
- The Town has plans to build a new 5-bay garage at the Municipal Light Plant, and to install a detention basin to control runoff from the building. The West Boylston Municipal Light Plant operates and maintains the electrical grid in Town.
- The Town has improvements planned at the the intersection of Lee Street and Goodale Street, which include installing dry wells or other stormwater infrastructure. Improvements to this intersection present the opportunity to implement stormwater best management practices or green infrastructure.
- The Town has plans to improve Pride Park to make it handicap accessible and disability inclusive. Improvements to the park present the opportunity to implement stormwater best management practices or green infrastructure. The Town owns the park, but it is utilized exclusively by the School Department. The Town consulted with O'Brien and Sons, the company who built Pride Park, on the renovation. The Pride Park ADA Update Advisory Committee is comprised of residents and town representatives. The Town is currently examining the possibility of adding tree filter pits to manage stormwater on-site.
- The Town has plans to create a new cemetery, which presents an opportunity to implement stormwater best management practices or green infrastructure. At Town Meeting on July 6, 2020, voters approved the transfer of town-owned land to the Cemetery Department for creation of a new cemetery along the North Side of Paul Tivnan Drive. The land, which contains approximately 35.55 acres, is described in a deed recorded with the Worcester South District Registry of Deeds in Book 32654, Page 314.

- The Town is in the process of building a new drinking water treatment facility. The West Boylston Water District proposed a New Water Treatment Facility for the removal of manganese from the Oakdale Well on the Central MA Rail Trail at 699 Thomas Street. A stormwater basin to capture runoff from the building was proposed, which would be located outside of the 200-foot riverfront protection buffer zone, as well as an infiltration basin for backwash water to infiltrate once its settled, also out of the buffer zone.

## 2.6 Current Storm Sewer Level of Service

The level of service for stormwater infrastructure is the expectation of the storm sewer system to effectively control stormwater quantity and quality for the community. This includes meeting and maintaining regulatory and environmental standards, specifically those set forth by the MS4 Permit. The level of service is meant to be evaluated system-wide to determine the ability of the system to provide protection against flood events and improve receiving water quality.

Installing BMPs that reduce volume of flow in the drainage system and improve water quality through infiltration and storage capacity will have the greatest benefit in areas with storm sewers that have below average level of service.

## 2.7 Discharges to Water Quality Limited Waters

The Town is comprised of 0.9 square miles (6.9%) of water, and the Town is located mostly within the Nashua River Watershed; the southernmost part of town is located within the Blackstone River Watershed. The primary impaired water bodies in town include the Wachusett Reservoir, Gates Brook, Poor Farm Brook, Malden Brook, Muddy Brook, Scarletts Brook, two unnamed tributaries to the Wachusett Reservoir, and the Quinapoxet River. These water bodies are impaired for a number of factors according to the Final 2018/2020 Integrated List of Waters. The Integrated List of Waters, better known as the "303(d) list," identifies impaired surface waters and their reasons for impairment. All impairments to these water bodies are summarized in Table 1.

Table 1 Impaired Waters in West Boylston, MA		
Water Body Name	Segment ID	Impairment(s)
Gates Brook	MA81-24	Chloride, Fecal Coliform, Escherichia Coli (E. Coli)
Malden Brook	MA81-27	Temperature
Muddy Brook	MA81-28	Benthic Macroinvertebrates
Poor Farm Brook	MA51-17	(Dewatering*) Aquatic Plants (Macrophytes), Escherichia Coli (E. Coli), Temperature
Quinapoxet River	MA81-32	(Dewatering*), Temperature
Scarletts Brook	MA81-25	Chloride



Table 1 Impaired Waters in West Boylston, MA

Unnamed Tributary (outlet Carrols Pond to mouth at inlet Wachusett Reservoir)	MA81-49	Chloride
Unnamed Tributary (headwaters west of Route 140 to mouth at inlet Wachusett Reservoir)	MA81-54	Chloride
Wachusett Reservoir	MA81147	(Brittle Naiad, Najas Minor*), (Eurasian Water Milfoil, Myriophyllum spicatum*), (Fanwort*), (Non-Native Aquatic Plants*), Mercury in fish tissue <sup>+</sup>

\*TMDL not required, non-pollutant.

<sup>+</sup>Impairments which have an approved TMDL.

The Town is subject to the requirements of Appendix H of the MS4 permit, which outlines requirements related to discharges to water quality limited water bodies. Poor Farm Brook (MA51-17) and Gates Brook (MA81-24) are impaired for E. coli and require the development of bacteria TMDLs. Gates Brook, Scarletts Brook (MA81-25), the Unnamed Tributaries to the Wachusett Reservoir (MA81-49 and MA81-54; MA81-49 is locally known as the West Boylston Brook) are impaired for chloride and require the development of chloride TMDLs.

Section 3.0 of the MS4 Permit contains additional requirements for discharges to surface drinking water supplies and their tributaries. Permittees should provide pretreatment and spill control measures to stormwater discharges to public drinking water supply sources or their tributaries to the extent feasible. Structural BMPs within catchments discharging to drinking water supply sources will provide treatment to stormwater discharges and improve overall water quality in these areas. Other areas which would benefit from BMP retrofit are catchments tributary to public swimming beaches.

According to data available from MassGIS, there are class A and B surface water protection zones in West Boylston associated with the Wachusett Reservoir. The Wachusett Reservoir is a source of high-quality drinking water for the Massachusetts Water Resource Authority (MWRA) water supply system, which serves Boston and surrounding communities. The Wachusett Reservoir and surrounding lands are managed and protected by the Department of Conservation and Recreation’s Division of Water Supply Protection, Office of Watershed Management (DWSP). West Boylston does not have any public swimming beaches; swimming is prohibited in the Wachusett Reservoir.

*Discharges to Phosphorus Impaired Receiving Waters*

The Town of West Boylston is partially located within the Blackstone River Watershed, and this portion of the town is tributary to Lake Quinsigamond, which has a Total Maximum Daily Load (TMDL) for phosphorus. For phosphorus impaired waters with a TMDL, Appendix F of the 2016 MS4 Permit requires the development of a Phosphorus Control Plan (PCP) to reduce the amount of

phosphorus in stormwater discharges from the storm drain system to these impaired receiving waters and their tributaries. The PCP must include intermediate and final phosphorus loading reduction targets that must be met through implementation of structural and non-structural BMPs. The phosphorus reduction associated with each structural BMP retrofit project within the watershed can be applied to the phosphorus loading target. The 2016 MS4 Permit does not currently require the Town to develop a PCP for Lake Quinsigamond. However, if notification is received from EPA that West Boylston must develop a PCP, BMP retrofit of municipally-owned parcels and roadways that are within the watershed should be prioritized to help comply with the requirements of the PCP and Appendix F.

### 3.0 BMP RETROFIT INVENTORY

This section includes an inventory of BMP retrofit projects that the Town is considering implementation of in the future.

#### 3.1 Site #1: Department of Public Works

Address: 35 Worcester Street, West Boylston MA

Parcel ID: 143-72

Total Lot Size: 3 Acres

Total Impervious Area (acre/%): 73%

Total Pervious Area (acre/%): 27%

Predominant Hydrologic Soil Group (HSG) and Groundwater Status: The parcel has 83% Type A soils on the eastern portion of the site, and 17% Type B soils on the western portion of the site. Well data from nearby locations at 109 Goodale Street and 19 West Boylston Street report unsaturated thicknesses of 15 feet and 13 feet, respectively.

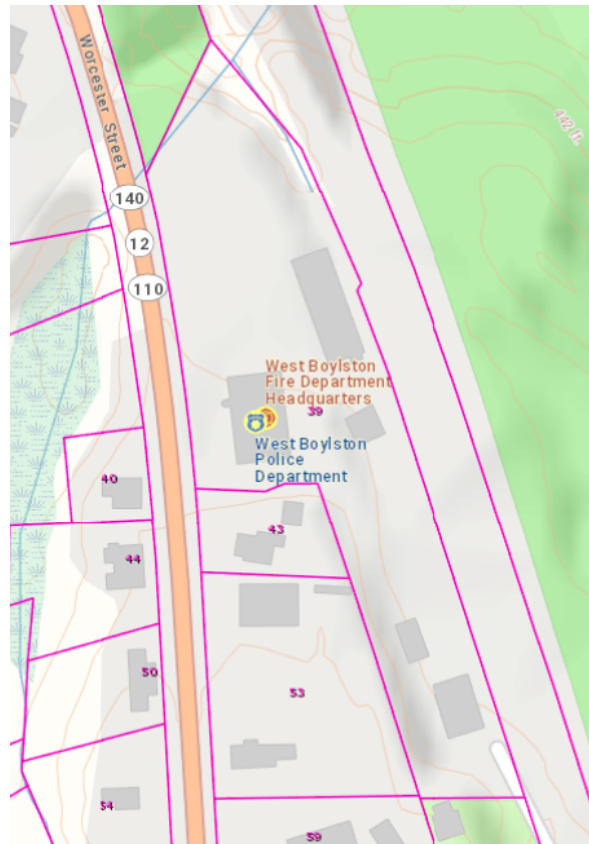
Proximity to Planned Capital Improvements: The Town has plans to reconstruct the parking lot at the Department of Public Works.

Proximity to Water Quality Limited Waters: Stormwater from the site may be collected by the MS4 which discharges to West Boylston Brook, which is tributary to the Wachusett Reservoir.

Proximity to Existing Storm and Sanitary Sewers: There is an existing sanitary sewer main on Worcester Street and storm drain infrastructure on the parcel including a catch basin and drain manhole that discharge to an outfall which is tributary to the West Boylston Brook.

Site Description: The Department of Public Works is located on a 3 acre municipally owned parcel on Worcester Street that includes the Fire Department and is surrounded by commercial and residential properties. The site contains the public works and fire department buildings and parking areas, a garage and storage sheds for the Public Works Department, and various material stockpiles. The West Boylston Brook crosses the north section of the parcel, flowing to the Wachusett Reservoir. Since the Fire and Public Works Departments are in the same vicinity, the site provides excellent opportunities for public education.

Snapshot of Site:



Feasible BMP Installations: Green infrastructure such as bioretention areas, vegetated bump-outs, or filter strips, could be installed within the parking area. Conversion of the catch basin in the parking area to a series of leaching catch basins or infiltration trenches would prevent pollutants from entering the MS4. The Town could also consider the use of permeable pavement in the parking area. Any green infrastructure practice in this area would disconnect impervious surfaces from the MS4.

3.2 Site #2: West Boylston Municipal Light Plant

Address: 4 Crescent Street, West Boylston, MA

Parcel ID: 143\_56

Total Lot Size: 0.79 Acres

Total Impervious Area (acre/%): 69%

Total Pervious Area (acre/%): 31%

Predominant Hydrologic Soil Group (HSG) and Groundwater Status: The parcel is comprised of 100% Type A soils. Well data from nearby locations at 125 Crescent Street and 109 Goodale Street report unsaturated thicknesses of 24 feet and 15 feet, respectively.

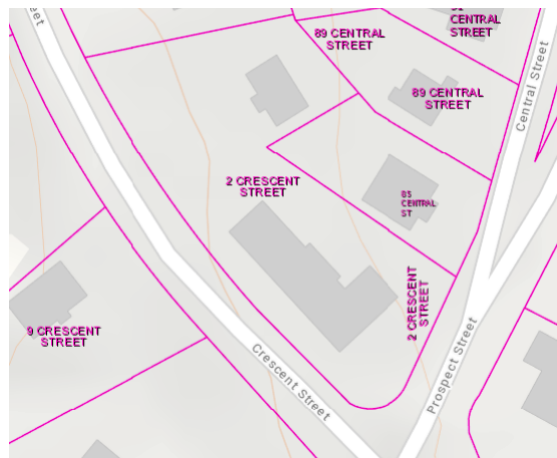
Proximity to Planned Capital Improvements: The Town has plans to install a new garage at the Municipal Light Plant, and to install green infrastructure to control runoff from the property.

Proximity to Water Quality Limited Waters: West Boylston Brook/ Wachusett Reservoir

Proximity to Existing Storm and Sanitary Sewers: There is existing sanitary sewer on Crescent Street and storm drain infrastructure on the street including a series of catch basins and drain manholes discharging to an outfall off Central Street which is tributary to the West Boylston Brook.

Site Description: The Light Plant is located on a 0.79 acre municipally owned parcel on the corner of Crescent Street and Prospect Street surrounded by commercial and residential properties. The site contains a parking area, garage, main building and a small landscaped area.

Snapshot of Site:



Feasible BMP Installations: Green infrastructure such as bioretention areas, vegetated bump-outs, or filter strips, could be installed within the parking area. Conversion of the catch basin on Crescent Street to a leaching catch basin or infiltration trench would provide

treatment for runoff from the parking area. The Town could also consider the use of permeable pavement in the parking area.

### 3.3 Site #3: Lee Street and Goodale Street Intersection

Address: Lee Street and Goodale Street, West Boylston, MA

Parcel ID: Not Applicable

Total Lot Size: Not Applicable

Total Impervious Area (acre/%): Not Applicable

Total Pervious Area (acre/%): Not Applicable

Predominant Hydrologic Soil Group (HSG) and Groundwater Status: At the intersection of Lee Street, the western portion of Goodale Street has Type B soils, and the eastern portion of Goodale Street has Type C soils. Well data from nearby locations at 357 Goodale Street and 153 Lee Street report unsaturated thicknesses of 25 feet and 39 feet, and depth to bedrock of 10 feet and 15 feet, respectively.

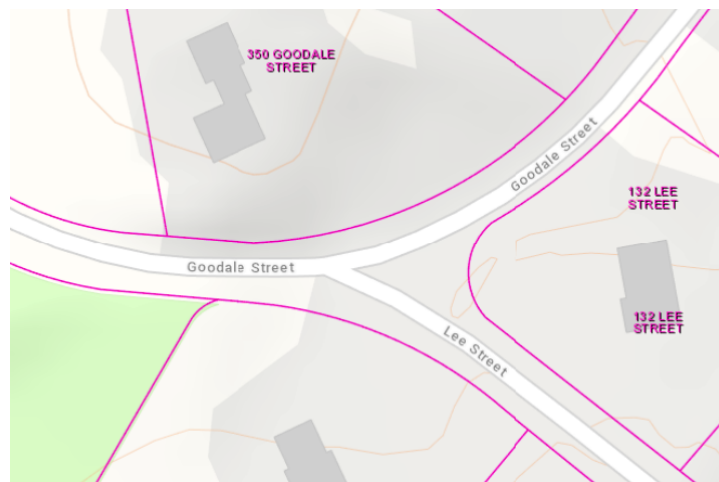
Proximity to Planned Capital Improvements: The Town has plans to reconstruct this intersection.

Proximity to Water Quality Limited Waters: None.

Proximity to Existing Storm and Sanitary Sewers: There are no known existing storm or sanitary sewers on Goodale Street or Lee Street where they intersect.

Site Description: The intersection of Goodale Street and Lee Street is surrounded by residential properties and is adjacent to the Malden Hill Conservation Area.

Snapshot of Site:



Feasible BMP Installations: A bioretention area could be installed in the intersection to provide traffic calming and treat surface runoff. Leaching catch basins or infiltration trenches would also provide stormwater retention and treatment at this intersection.

### 3.4 Site #4: Pride Park Playground

Address: 70 Crescent Street, West Boylston, MA

Parcel ID: 138\_3

Total Lot Size: 8.20 Acres

Total Impervious Area (acre/%): 32%

Total Pervious Area (acre/%): 68%

Predominant Hydrologic Soil Group (HSG) and Groundwater Status: The parcel has 90% Type A soils. Well data from nearby locations at 125 Crescent Street and 109 Goodale Street report unsaturated thicknesses of 24 feet and 15 feet, respectively.

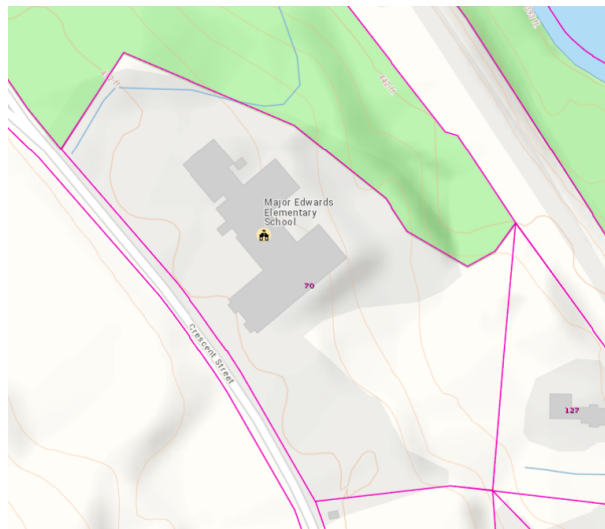
Proximity to Planned Capital Improvements: The Town has plans to reconstruct Pride Park.

Proximity to Water Quality Limited Waters: Wachusett Reservoir

Proximity to Existing Storm and Sanitary Sewers: There is existing sanitary sewer on Crescent Street and minimal storm drain infrastructure on the street including a small series of catch basins discharging to an outfall on the south portion of the site.

Site Description: Pride Park Playground is located on an 8.2 acre municipally owned parcel that includes Major Edwards Elementary School. The parcel is across from Goodale Park and adjacent to DCR owned land. The school next to the park and the proximity to the Wachusett Reservoir provides excellent opportunities for public exposure and engagement.

Snapshot of Site:



Feasible BMP Installations: Green infrastructure such as bioretention areas, tree pits, or vegetated filter strips could be installed during redevelopment. Conversion of the catch basin on Crescent Street to a leaching catch basin or infiltration trench would provide treatment for stormwater runoff on the street.

3.5 Site #5: Paul X Tivnan Drive Cemetery

Address: Paul X Tivnan Drive, West Boylston

Parcel ID: 177\_2

Total Lot Size: 35.55 Acres

Total Impervious Area (acre/%): 0%

Total Pervious Area (acre/%): 100%

Predominant Hydrologic Soil Group (HSG) and Groundwater Status: The eastern portion of the site is comprised of Type C soils, which cover 60% of the parcel. The western portion of the site is comprised of Type A soils, which cover 34% of the parcel. Type C/D soils comprise the remaining 6% of the site. Well data from nearby locations at 180 Shrewsbury Street and 99 Hartwell Street report unsaturated thicknesses of 9 feet and 10.5 feet, respectively.

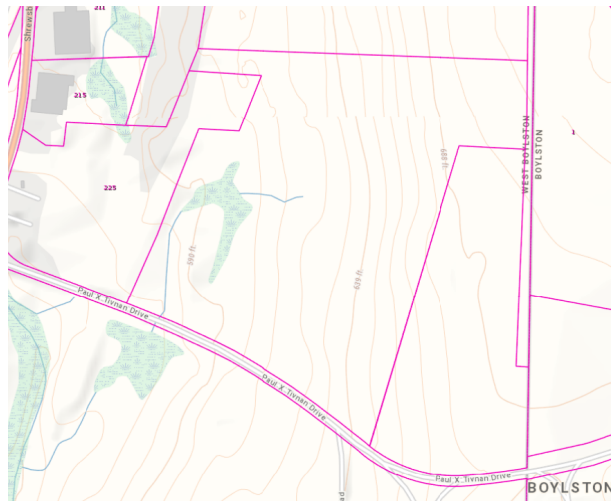
Proximity to Planned Capital Improvements: The Town has plans to construct a new cemetery in this location.

Proximity to Water Quality Limited Waters: Wetlands on the parcel are tributary to Poor Farm Brook.

Proximity to Existing Storm and Sanitary Sewers: There are no known existing storm or sanitary sewers on the portion of Paul X Tivnan Drive that the parcel borders.

Site Description: The site consists of a 35.5 acre municipally-owned parcel located on Paul X Tivnan Drive off Shrewsbury Street and across from the Worcester County Sheriff's Office and the Worcester County Jail & House of Correction.

Snapshot of Site:



Feasible BMP Installations: Green infrastructure practices, such as bioretention areas, vegetated filter strips, leaching catch basins and infiltration trenches could be installed to disconnect any impervious surfaces added during the development of the cemetery. The



Town should also consider permeable pavement for any streets or parking areas added during development.

## 4.0 INVENTORY MAINTENANCE AND ANNUAL REPORTING

Beginning with the Permit Year 5 Annual Report and in each subsequent annual report, the Town is required to identify a minimum of five sites from this inventory for potential BMP retrofit opportunities. The sites outlined in this report should be included in the Town's annual report. As BMP projects are designed and completed, the Town is required to update this list to maintain at least 5 sites, until such a time that the Town has less than 5 sites remaining. In addition to reporting the sites in the inventory, the Town is required to report on all properties that have been modified or retrofitted with BMPs to mitigate impervious area that were previously inventoried. The Town may also include any non-MS4 owned property that has been modified or retrofitted with BMPs to mitigate impervious area in its annual report.



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# REPORT

June 2022

TOWN OF

**West Boylston**

MASSACHUSETTS

Year 4 MS4 Permit Compliance

Street Design and Parking Lots Report

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## ATTACHMENTS

Attachment A – Regulatory Review Matrix

## 1.0 INTRODUCTION

### 1.1 Regulatory Requirement

The 2016 Massachusetts Municipal Separate Storm Sewer Systems (MS4) General Permit, which came into effect on July 1, 2018, regulates discharges from small 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 must implement various Best Management Practices (BMPs) for each of the following six minimum control measures:

- Public Education and Outreach
- Public Participation/Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Stormwater Management in New Development and Redevelopment (Post-Construction Stormwater Management)
- Good Housekeeping and Pollution Prevention for Municipal Operations

As part of the minimum control measure for Post-Construction Stormwater Management, Section 2.3.6 of the 2016 MS4 Permit requires regulated communities to assess current street design and parking lot guidelines and other local requirements that affect the creation of impervious cover, and to summarize those findings in a report. The purpose of this exercise is to determine if changes to existing design standards can be made to support low impact design options and, where appropriate, propose recommendations and proposed schedules to incorporate policies and standards into the relevant regulatory mechanisms to minimize impervious cover in parking areas and street designs.

The Town of West Boylston shall implement the recommendations included in this report in the specified timeframe. The status of this assessment and any planned or completed changes to the relevant regulatory mechanisms shall be reported in each MS4 annual report.

### 1.2 Applicable Regulatory Mechanisms and Assessment Procedure

The following bylaws, rules and regulations, policies, and/or design standards address the creation of impervious cover in West Boylston and were reviewed as part of this assessment:

- Zoning Bylaws
- Rules & Regulations Governing the Subdivision of Land
- Driveway Location Rules & Regulations

Additionally, West Boylston's Stormwater Bylaw was reviewed but found not to include any relevant language relating to the creation of impervious cover in West Boylston. Each regulatory mechanism listed above was reviewed using the matrix included in Attachment A. The mechanisms were reviewed using a list of key questions in five categories, and the degree to which each mechanism addresses a key question was rated as Conventional, Better, or Best using a system based on the

Local Bylaw and Regulation Assessment Tool developed by MassAudubon.<sup>1</sup> The definition for each rating is as follows:

- Conventional: The key question is not addressed, or no flexibility is allowed in design requirements. Dimensional standards include required minimum but no maximum (i.e., minimum driveway width but no maximum).
- Better: The key question is addressed, and some flexibility is allowed in design requirements, usually by special permit. LID design practices, including minimizing created impervious area, are encouraged but not required.
- Best: The key question is addressed, and flexibility in design is allowed by-right. LID practices, including minimizing created impervious area, are required or incentivized.

The results of this analysis are summarized in Section 2.0. Recommended updates to the assessed regulatory mechanisms are included in Section 3.0, and a proposed timeline for implementing those updates is presented in Section 4.0.

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<sup>1</sup> Supporting LID in Your Community, Local Bylaw and Regulation Assessment Tool, MassAudubon, 2017.  
<https://www.epa.gov/npdes-permits/stormwater-tools-new-england#pcsm>

## 2.0 REVIEW OF REGULATORY MECHANISMS

The matrix included in Attachment A was used to review how West Boylston's regulatory mechanisms and design standards address the creation of impervious cover in Town in the following categories:

- Impervious Area Management – Streets
- Impervious Area Management – Driveways
- Impervious Area Management – Sidewalks
- Impervious Area Management – Parking Lots
- Vegetation and Landscaping/Limits of Disturbance

This section summarizes the results of the analysis for each category.

### 2.1 Category 1: Impervious Area Management – Streets

Category 1 includes key questions such as the minimum roadway widths in West Boylston, required right-of-way widths, and the minimum and/or maximum cul-de-sac diameter.

The roadway design standards for the Town are specified in Section 6.B, Streets, in the Subdivision Rules and Regulations. Streets in West Boylston are classified as either Local Residential, Residential Feeder, Industrial Primary, or Industrial Secondary. The local residential street is defined as “a street serving no more than ten (10) private residences and designed primarily for passenger vehicles and light trucks”. The residential feeder street is “a street serving as major access into and/or through a commercial, business or industrial district”. The industrial primary is “a street serving as a major access into and/or through a commercial, business or industrial district”. The industrial secondary is “all other streets in commercial or industrial districts not qualifying as a primary industrial street”. Table 1 in the Subdivision Rules and Regulations includes roadway right-of-way widths, pavement widths, mid-centerline radii, minimum grades, maximum grades, maximum grades on curves, minimum stopping distances and the maximum number of lots or dwelling units served for each road category.

Table 1: Roadway Design Standards

	Local Residential	Residential Feeder	Industrial Primary	Industrial Secondary
Widths				
Right-of-way	50 feet	50 feet	60 feet	60 feet
Pavement	22 feet	26 feet	32 feet	26 feet
Mid-centerline Radius	100 feet	300 feet	500 feet	200 feet
Grades				
Minimum	1.0%	1.0%	1.0%	1.0%
Maximum	10.0%	8.0%	6.0%	8.0%
Maximum on Curves	6.0%	4.0%	4.0%	4.0%
Minimum Stopping Distance	200 feet	275 feet	325 feet	275 feet

Maximum Number of Lots or Dwelling units Served	10	N/A	N/A	10
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#### *Minimum Residential Roadway Width & Determinant*

This section was rated “conventional” due to the major and minor residential categories for roadways with no flexibility in applying the design standards set forth in the Subdivision Rules & Regulations.

#### *Minimum Non-Residential and Mixed-Use Roadway Pavement Widths & Determinants*

This section was rated “conventional” due to the major and minor industrial categories for roadways with no flexibility in applying the design standards set forth in the Subdivision Rules & Regulations.

#### *Road Right-of-Way Widths*

This section was rated “conventional” due to the 50-foot right-of-way specification for residential roadways and 60-foot right-of-way specification for industrial roadways in the Subdivision Rules & Regulations.

#### *Road Right-of-Way Allowable Usage*

This section was rated “conventional”; road right-of-way allowable usage is not mentioned in any of the Town’s current regulatory mechanisms.

#### *Allowable Dead End Street Design*

This section was rated “conventional” due to specified design standards for dead end streets including maximum length and minimum turnaround diameter. Section 6.B, Streets in the Subdivision Rules & Regulations states that “Dead end streets shall not be longer than 750 feet measured along the centerline, from the center line of the intersecting through street to the end of the turnaround, and shall be provided at the closed end with a turnaround having an outside property line diameter of at least 120 feet.”

#### *Allowable Cul de Sac Design*

This section was rated “better” due to the recommendation of center bioretention islands for cul-de-sacs. Section 6.B, Streets in the Subdivision Rules & Regulations states that “Where site conditions are favorable, cul-de-sac islands shall be designed to treat and infiltrate runoff through bioretention. The paved area should be pitched allowing the stormwater runoff to flow into the center bioretention area for treatment and infiltration. The center bioretention area shall be depressed to allow the collection and infiltration of surface runoff. In slowly permeable soils (less than 0.3 inches/hour) a perforated underdrain may be installed at the bottom of the excavation to prevent ponding. Any standards adopted by the Massachusetts Department of Environmental Protection will supersede this clause.”

#### *Curb Cuts/ Flush Cuts*

This section was rated “better” because tapered terminal curbs are required as the first and last stones along each section of granite curbing and adjacent to catch basin curb inlets in Section 7.D, Curbs of the Subdivision Rules & Regulations. Curb breaks are also required at the intersection of bikeways and streets. In addition, vegetated open channels are allowed instead of traditional curbs and gutters if approved by the Planning Board. Section 6.E, Storm Water Management, states that



“Provisions may be made to construct vegetated open channels in lieu of traditional curbs and gutters, where, in the opinion of the Planning Board, it is appropriate and reasonable.”

## 2.2 Category 2: Impervious Area Management – Driveways

Category 2 includes key questions such as minimum and/or maximum driveway widths, required front yard setbacks, and whether or not shared driveways are allowed in the Town of West Boylston.

The driveway design standards for the Town are specified in the Driveway Location Rules & Regulations and the Zoning Bylaws. Table 2 in the Rules & Regulations includes design standards for minimum and maximum widths, curb radii, angles of entry, minimum and maximum vertical alignments within the right-of-way, minimum distances off the property line, minimum distances between drives, minimum distances from street intersections, number of driveways per lot, and minimum sight distances for residential, commercial, and common driveways.

Table 2: Typical Driveway Design Standards

Standard	Residential Driveways	Commercial Driveways	Common Driveways
Width at Street Line			
Minimum	12 ft.	24 ft.; 12 ft. one-way	15 ft.
Maximum	18 ft.	30 ft.; 20 ft. one-way	24 ft.
Curb Radius			
Minimum	3 ft.	20 ft.; 10 ft. one-way	5 ft.
Maximum	10 ft.	30 ft.; 30 ft. one-way	20 ft.
Angle of Entry	60°-90°	75°-90°	60°-90°
Vertical Alignment Within Right of Way			
Minimum	1.0%	1.0%	1%
Maximum	3.0%	3.0%	3%
Minimum Distance off Property Line	10 ft.	10 ft.	10 ft.
Minimum Distance Between Drives	20 ft.	20 ft.	20 ft.
Minimum Distance from Street Intersection	30 ft.	30 ft.	30 ft.
Number of Driveways per lot	1 per 90 ft. of frontage	1 per 100 ft. of frontage	
Minimum Sight Distance			
for 30 MPH	200 ft.	200 ft.	200 ft.
for 40 MPH	325 ft.	325 ft.	325 ft.
for 50 MPH	475 ft.	475 ft.	475 ft.
Turnaround Areas			At each terminus.

#### *Required Minimum Driveway Width*

This section was rated “conventional” because there is no flexibility in the minimum and maximum driveway widths at the street line for residential, commercial, and common driveways in the Driveway Location Rules & Regulations.

#### *Ability to Reduce Minimum Driveway Width*

This section was rated “conventional” because there is no flexibility in the driveway width standards in the Driveway Location Rules & Regulations.

#### *Required Front Yard Setback*

This section was rated “conventional” because there is no flexibility in the 10-foot required minimum setback in the Driveway Location Rules & Regulations.

#### *Two-Track Design*

This section was rated “conventional” because there is no flexibility in the design standards in the Driveway Location Rules & Regulations.

#### *Shared Driveways*

This section was rated “better” because common driveways are allowed for up to 4 lots with a Special Permit from the Planning Board as described Section 4.3.H, Common Driveways of the Zoning Bylaws. The Driveway Location Rules & Regulations includes specifications for common driveways.

### 2.3 Category 3: Impervious Area Management – Sidewalks

Category 3 includes key questions such as sidewalk placement requirements, minimum sidewalk widths, and allowable sidewalk materials in the Town of West Boylston.

The sidewalk design standards for the Town are specified in the Subdivision Rules & Regulations.

#### *Sidewalk Placement Requirements*

This section was rated “better” because sidewalks are only required on one side of all subdivision streets and ways as described in Section 6.C, Sidewalks, Bikeways and Walking Paths in the Subdivision Rules and Regulations.

#### *Sidewalk Width*

This section was rated “conventional” because there is no flexibility in the five-foot required minimum width for sidewalks and walking paths in Section 6.C, Sidewalks, Bikeways and Walking Paths in the Subdivision Rules and Regulations.

#### *Sidewalk Material*

This section was rated “best” because permeable sidewalks are recommended in the Subdivision Rules and Regulations. Section 6.C, Sidewalks, Bikeways and Walking Paths states that “To the extent practicable, permeable paving (porous asphalt or pervious concrete) shall be used for sidewalks, provided the appropriate soil and slope conditions exist. When a sidewalk is constructed of permeable pavement, as approved by the Planning Board, runoff shall be directed away from the sidewalk.”

## 2.4 Category 4: Impervious Area Management – Parking Lots

Category 4 includes key questions such as required parking ratios, required parking space dimensions, and whether landscaping is required in parking lot designs in the Town of West Boylston.

The parking lot design standards for the Town are specified in the Zoning Bylaws. Section 5.2, Off Street Parking and Loading, includes the off-street parking requirements for each use.

### *Required Parking Ratios*

This section was rated “conventional” because Section 5.2, Off Street Parking and Loading, of the Zoning Bylaws specifies the amount of parking spaces that are required for different residential, commercial, and industrial uses with no or limited flexibility to reduce the minimums based on street or other available parking or transit.

### *Allowable Off-Street Parking for Commercial and Mixed Uses*

This section was rated “conventional” because off-street parking is required for all uses in the Town’s Zoning Bylaws. The number of commercial/mixed use parking spaces is specified in Section 5.2, Off Street Parking and Loading.

### *Off-Site Parking Distance Limit*

This section was rated “conventional” because off-street parking is required to be located on the same lot in the Town’s Zoning Bylaws. Section 5.2, Off Street Parking and Loading states that “Required parking shall be provided on the same lot with the main use it is to serve. In business and manufacturing districts, required parking shall be provided through the same ownership within one thousand feet (1,000’) of the use it is to serve.”

### *Ability to Reduce Parking Requirements Where Public Transportation is Available*

This section was rated “conventional” because there is no flexibility in the parking requirements where public transportation is available in the Zoning Bylaws.

### *Other Ability to Reduce Parking Ratios*

This section was rated “better” because there are a few options for reducing the parking requirements in the Zoning Bylaws. Section 5.2, Off Street Parking and Loading states that “Housing designed specifically for elderly persons need provide only 50 percent (50%, of the space required above)” and that “The Board of Appeals shall hear and decide upon applications for Special Permits for the reduction of the required number of parking spaces by up to twenty-five percent (25%), if it can be demonstrated that two or more uses within a single development can share parking areas due to different hours of normal activity.”

### *Current Required Parking Space Dimensions*

This section was rated “conventional” because there is no flexibility in the parking space dimensions in the Zoning Bylaws. Section 5.2 Off Street Parking and Loading states that “Each parking space shall not be less than nine feet (9’) in width and eighteen feet (18’) in length.”

### *Shared Parking Agreements*

This section was rated “better” because shared parking is allowed in the Zoning Bylaws with a Special Permit from the Board of Appeals if two or more uses within a single development can share parking due to different hours of normal activity.

### *Model Shared Parking Agreement*

This section was rated “conventional” because a model shared parking agreement is not provided in any of the Town’s current regulatory mechanisms.

### *Drive Aisle Dimensions*

This section was rated “conventional” because drive aisle dimensions are not specified in the Zoning Bylaws. Section 5.2, Off Street Parking and Loading states that “Aisles shall provide adequate width for vehicles to enter or to leave parking spaces in a single motion.”

### *Drive Aisle Width*

This section was rated “conventional” because reducing drive aisle width is not mentioned in any of the Town’s current regulatory mechanisms.

### *Allowable Parking Lot Materials*

This section was rated “conventional” because the use of structural permeable pavement in parking lots is not mentioned in any of the Town’s current regulatory mechanisms. Parking lot material is not specified in the Zoning Bylaws.

### *Spillover Paving Materials*

This section was rated “conventional” because spillover paving is not mentioned in any of the Town’s current regulatory mechanisms.

### *Required Landscaping in Parking Lots*

This section was rated “better” because the Zoning Bylaws require portions of parking areas not used for parking spaces to be landscaped and landscaped separation strips between a parking area and the road. Section 5.2 Off Street Parking and Loading states that “Any portion of a parking area not used for parking space or circulation shall be landscaped and protected.” This section also requires that “A landscaped separation strip of at least five feet (5’) shall be provided between a parking area and an adjoining public way, except in manufacturing districts.” Section 3.6E, Site Design Standards requires that “Site plans involving more than thirty (30) parking spaces shall provide interior landscaping covering not less than five percent (5%) of the total area of the parking area. In total, there shall be provided one shade tree placed within the parking lot for every ten (10) spaces and complemented by shrubs and other planting material. Such trees shall be at least two (2) inches in trunk diameter at the time of planting, and shall be located in planting beds at least six feet (6’) in width or diameter. In case it can be shown to the Planning Board that the planting of trees is impractical, the Planning Board may authorize plantings and shrubbery instead of trees.”

## 2.5 Category 5: Vegetation and Landscaping/Limits of Disturbance

Category 5 includes key questions such as whether stormwater practices are allowed to be incorporated into required landscape areas and if there are minimum yard sizes in place for various uses in the Town of West Boylston.

The vegetation and landscaping design standards for the Town are specified in the Driveway Location Rules & Regulations, the Subdivision Rules & Regulations and the Zoning Bylaws.

*Vegetated Stormwater Practices in Landscape Areas (Buffer Strips, Landscape Islands, etc.)*

This section was rated “better” because bioretention islands are recommended for dead end streets in Section 6.B, Streets, in the Subdivision Rules & Regulations. Vegetated stormwater practices in landscape areas are not mentioned elsewhere in the Town’s current regulatory mechanisms.

*Roof Runoff Requirements*

This section was rated “conventional” because roof runoff is not mentioned in any of the Town’s current regulatory mechanisms.

*Maximum and Minimum Yard Sizes for Various Uses*

This section was rated “conventional” because minimum yard sizes for single residence, general residence, business, industrial, commercial/limited industrial and aquifer protection districts are specified in Section 4.2, Schedule of Dimensional Requirements in the Zoning Bylaws.

*Vegetated Stormwater BMPs in Setbacks*

This section was rated “conventional” because landscaping is required in setbacks as part of the site plan approval process in Section 3.6E, Site Design Standards of the Zoning Bylaws and vegetated open channels are allowed in lieu of traditional curbs and gutters in Section 6.E, Stormwater Management of the Subdivision Rules & Regulations.

### 3.0 RECOMMENDED REGULATORY UPDATES

This section includes recommended regulatory updates identified as a result of the analysis summarized in Section 2.0. The recommended language will update West Boylston's regulatory mechanisms to meet the following goals:

- Promote efficient, compact development patterns and infill
- Promote smart designs for streets and parking lots that reduce overall impervious area and directly connected impervious area<sup>2</sup>
- Support low impact design<sup>3</sup> options

The updates recommended in this section will be implemented in the timeframes included in Section 4.0.

#### 3.1 Updates to Zoning Bylaws

The following updates to the Zoning Bylaw should be considered to meet the goals outlined above:

- Update Section 3.6E, Site Design Standards, to count bioretention and other vegetated LID features towards site landscaping and open space requirements.
- Update Section 4.2, Schedule of Dimensional Requirements, to encourage the minimization of clearing and grubbing within lots, and to allow minimization of lot size, setback and frontage requirements.
- Update Section 5.2, Off Street Parking and Loading, to establish maximum parking spaces allowed, to allow flexibility to reduce parking requirements based on street or other available parking or transit, to allow shared parking by-right, and to explicitly allow LID/ bioretention in required landscape areas within parking areas.

#### 3.2 Updates to Subdivision Rules & Regulations

The following updates to the Subdivision Rules & Regulations should be considered to meet the goals outlined above:

- Update Section 6.B, Streets, to allow for flexibility in reducing road width and road right-of-way widths. This section should also recommend the use of alternative, permeable materials for low traffic or secondary emergency access and all shoulders. The dead-end street design standard should be updated to allow minimized end radii or a hammerhead turnaround.
- Update Section 6.C, Sidewalks, Bikeways and Walking Paths, to allow for flexibility in reducing sidewalk and walking path widths.

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<sup>2</sup> Directly connected impervious area (DCIA), or effective impervious area, is the portion of impervious cover that creates a direct conveyance of stormwater to a storm drain or waterway.

<sup>3</sup> Low impact development (LID) is defined by EPA as a management approach and set of practices that can reduce runoff and pollutant loadings by managing stormwater runoff as close to its source(s) as possible and promoting the use of natural systems to manage stormwater by infiltration, evapotranspiration, and rainwater harvesting/reuse.

- Update Section 6.E, Stormwater Management, to require directing clean roof runoff to landscaped or naturally vegetated areas for infiltration.
- Update Section 7.D, Curbs, to state that roadside swales are preferred over closed drainage systems. This section should also be updated to explicitly allow curb cuts near landscaped areas to allow stormwater to flow directly into vegetated features or green infrastructure.

### 3.3 Updates to Driveway Location Rules & Regulations

The following updates to the Driveway Location Rules & Regulations should be considered to meet the goals outlined above:

- Update this document to allow for flexibility in reducing the minimum driveway width, front yard setbacks, and to encourage the use of permeable pavers or pavement for driveways.

#### 4.0 IMPLEMENTATION TIMEFRAMES FOR REGULATORY UPDATES

Under Section 2.3.6.b. of the 2016 Massachusetts MS4 Permit, the Town of West Boylston shall implement the recommended updates to their regulatory mechanisms included in this report in the timeframes outlined in this section. The timeframes reflect the regular meeting schedule of the relevant Town departments and boards and consider any other planned updates to the regulatory mechanisms. Implementation timeframes for the recommended updates to each document are summarized in Table 4.1.

Regulatory Mechanism	Appropriate Review Board	Complete First Draft of Updates	Complete Internal Review	Present Updates to Appropriate Review Board	Adopt Proposed Changes
Zoning Bylaws	Zoning Board of Appeals	December 2022	March 2023	May 2023	June 2024
Subdivision Rules & Regulations	Planning Board	December 2022	March 2023	September 2023	December 2023
Driveway Location Rules & Regulations	Planning Board	December 2022	March 2023	September 2023	December 2023



Attachment A – Regulatory Review Matrix

Town of West Boylston MS4 Permit Compliance

Street Design and Parking Lots Report - Regulatory Review Matrix

Key Question	Zoning Bylaw/Ordinance		Subdivision Rules & Regulations		Driving Location Rules & Regs		Score
	Section Reference	Language	Section Reference	Language	Section Reference	Language	
<b>Category 1: Impervious Area Management - Streets</b>							
Minimum residential roadway width & determinant			6.B Streets	22-26 feet, Local Residential and Residential Feeder			Conventional
Minimum non-residential and mixed-use roadway pavement widths & determinants			6.B Streets	26-32 feet, Industrial Secondary and Industrial Primary			Conventional
Road right-of way widths			6.B Streets	50-60 feet, Residential and Industrial			Conventional
Road right-of-way allowable usage			6.B Streets	Not mentioned			Conventional
Turnarounds for dead end streets - are various designs allowed?			6.B Streets	Yes			Conventional
Minimum/maxium cul-de-sac diameter - are islands allowed?			6.B Streets	Minimum outside property line diameter of 120 feet. Bioretention islands recommended where site conditions are favorable			Better
Use of curb cuts/flush curbs allowed			7.D Curbs	Tapered terminal curbs required at ends of curbing and adjacent to catch basin curb inlets. Curb cuts required for intersection of bikeways and streets.			Better
<b>Category 2: Impervious Area Management - Driveways</b>							
Required minimum driveway width			Driveway Location Rules & Regulations	Minimum and maximum widths for residential, commercial and common driveways, 12-18 ft, 24-30 ft, and 15-24 ft, respectively.			Conventional
Ability to reduce minimum driveway width			Driveway Location Rules & Regulations	No			Conventional
Required front yard setback			Driveway Location Rules & Regulations	Minimum distance of 10 ft off property line.			Conventional
Two-track design allowed?			Driveway Location Rules & Regulations	No			Conventional
Shared driveways allowed?	4.3.H Common Driveways	For lots to be used for residential dwelling purposes where adequate access is provided across the frontage, the Planning Board may grant a Special Permit to allow common driveways for no more than four (4) lots that meet the zoning requirements.	Driveway Location Rules & Regulations	Can be located on a common property line provided the proper easements have been recorded. Without a common property line, a minimum setback of 5 ft is required. Common Driveway design standards included.			Better

**Town of West Boylston MS4 Permit Compliance**

**Street Design and Parking Lots Report - Regulatory Review Matrix**

Key Question	Zoning Bylaw/Ordinance		Subdivision Rules & Regulations		Driving Location Rules & Regs		Score
	Section Reference	Language	Section Reference	Language	Section Reference	Language	
<b>Category 3: Impervious Area Management - Sidewalks</b>							
Requirements for sidewalk placement (ie, are sidewalks required on both sides of the street?)			6.C Sidewalks, Bikeways and Walking Paths	Sidewalks are required on one side of all subdivision streets and ways			Better
Minimum width (probably 4' for ADA compliance)			6.C Sidewalks, Bikeways and Walking Paths	Minimum of 5 foot width			Conventional
Are permeable/pervious sidewalks allowed?			6.C Sidewalks, Bikeways and Walking Paths	Permeable pavement is recommended if the appropriate soil and slope conditions exist. Use of permeable pavement, as approved by the Planning Board, shall be designed in accordance with the Massachusetts Stormwater Technical Handbook (as amended) or equivalent design guidelines and specifications approved by the Planning Board			Best
<b>Category 4: Impervious Area Management - Parking Lots</b>							
Current required parking ratios	5.2 Off Street Parking and Loading	Single family - 2 parking spaces per dwelling unit, Two Family/Multi Family- 2 parking spaces per dwelling unit, Hotel, Motel, Lodging, Rooming - 1 space per bedroom, Group, Dormitory- 1 space per resident car, Nursing, Convalescent and Rest Home - 1 space per 3 beds. Commercial and industrial parking space requirements specified as well.					Conventional
Allowable off-street parking for commercial/mixed uses?	5.2 Off Street Parking and Loading	Yes. Required number of parking spaces for commercial/mixed uses specified.					Conventional
Off-site parking distance limit	5.2 Off Street Parking and Loading	Required parking shall be provided on the same lot with the main use it is to serve. In business and manufacturing districts, required parking shall be provided through the same ownership within 1000' of the use it is to serve.					Conventional
Potential to reduce parking requirements where public transportation is available?	5.2 Off Street Parking and Loading	No					Conventional

**Town of West Boylston MS4 Permit Compliance**

**Street Design and Parking Lots Report - Regulatory Review Matrix**

Key Question	Zoning Bylaw/Ordinance		Subdivision Rules & Regulations		Driving Location Rules & Regs		Score
	Section Reference	Language	Section Reference	Language	Section Reference	Language	
Other ability to reduce parking ratios?	5.2 Off Street Parking and Loading	Housing for elderly persons need provide only 50% of parking spaces. The Board of Appeals shall hear and decide upon applications for Special Permits for the reduction of the required number of parking spaces by up to twenty-five percent (25%), if it can be demonstrated that two or more uses within a single development can share parking areas due to different hours of normal activity.					Better
Current required parking space dimensions	5.2 Off Street Parking and Loading	Minimum of 9 ft width and 18 ft length					Conventional
Allow for shared parking agreements	5.2 Off Street Parking and Loading	Yes - Board of Appeals decides on applications for Special Permits for reduction of required number of spaces up to 25%					Better
Provide a model shared parking agreement	5.2 Off Street Parking and Loading	No					Conventional
Current required drive aisle dimensions	5.2 Off Street Parking and Loading	Aisles shall provide adequate width for vehicles to enter or to leave parking spaces in a single motion.					Conventional
Ability to reduce minimum drive aisle width	5.2 Off Street Parking and Loading	Not mentioned					Conventional
Is the use of structural permeable pavement allowed?	5.2 Off Street Parking and Loading	Not mentioned					Conventional
Is spillover paring allowed to be impervious?	5.2 Off Street Parking and Loading	Not mentioned					Conventional

Town of West Boylston MS4 Permit Compliance

Street Design and Parking Lots Report - Regulatory Review Matrix

Key Question	Zoning Bylaw/Ordinance		Subdivision Rules & Regulations		Driving Location Rules & Regs		Score
	Section Reference	Language	Section Reference	Language	Section Reference	Language	
Required landscaping in parking lots?	5.2 Off Street Parking and Loading, 3.6E Site Design Standards	Landscaped separation strip of at least 5 ft required between parking area and an adjoining public way. Parking areas shall be set back a minimum of five feet (5') from any building wall and ten feet (10') from any boundary lines. Driveways may occupy any part of the required front or side yards. Any portion of a parking area not used for parking space or circulation shall be landscaped and protected. Site plans involving more than thirty (30) parking spaces shall provide interior landscaping covering not less than five percent (5%) of the total area of the parking area. In total, there shall be provided one shade tree placed within the parking lot for every ten (10) spaces and complemented by shrubs and other planting material. Such trees shall be at least two (2) inches in trunk diameter at the time of planting, and shall be located in planting beds at least six feet (6') in width or diameter.					Better
<b>Category 5: Vegetation and Landscaping/Limits of Disturbance</b>							
Are vegetated stormwater practices allowed/required to be incorporated into required landscape areas (buffer strips, landscape islands, etc)			6.B Streets	For dead end streets, where site conditions are favorable, cul-de-sac islands shall be designed to treat and infiltrate runoff through bioretention. The paved area should be pitched allowing the stormwater runoff to flow into the center bioretention area for treatment and infiltration. The center bioretention area shall be depressed to allow the collection and infiltration of surface runoff			Better

Town of West Boylston MS4 Permit Compliance

Street Design and Parking Lots Report - Regulatory Review Matrix

Key Question	Zoning Bylaw/Ordinance		Subdivision Rules & Regulations		Driving Location Rules & Regs		Score
	Section Reference	Language	Section Reference	Language	Section Reference	Language	
Is roof runoff required to be routed to pervious areas or dry wells?			Driveway Location Rules & Regulations	The driveway permit submittal requires that a sketch shall indicate that adequate precautions have been taken to provide for storm drainage and surface runoff at the proposed driveway entrance to prevent storm runoff from flowing down the proposed driveway into the street or abutting property and to prevent street runoff from flowing into the subject property via the proposed driveway. Drainage structures shall be shown when necessary. Sump pumps are prohibited from discharging onto roads or driveways and thence onto public streets.			Conventional
Are maximum and minimum yard sizes in place for various uses?	4.2 Schedule of Dimensional Requirements	Minimum Yard Sizes for Single Residence, General Residence, Business, Industrial, Commercial/Limited Industrial and Aquifer Protection districts specified.					Conventional
Are vegetated stormwater BMPs allowed in setbacks?	3.6E Site Design Standards	Site plan applicants are required to landscape the setbacks as part of the site plan approval process. Site plan applicants are expected to maintain the landscaping approved for the site and replace any landscaping that has not fully established itself within two growing seasons, after which all failed landscaping shall be replaced. Front yard setback landscaping shall consist of street trees and low-level plantings. Landscaping within 20 feet of a driveway shall consist solely of low-level plantings such that vehicular and pedestrian sight lines are not restricted.	6.E Stormwater Management	Provisions may be made to construct vegetated open channels in lieu of traditional curbs and gutters, where, in the opinion of the Planning Board, it is appropriate and reasonable. Vegetated open channels may consist of grass channels or dry swales. Grass channels are most appropriate for smaller drainage areas, mildly sloping topography, and housing density less than four (4) dwelling units per acre. Dry swales are most appropriate for high density areas. The Applicant may propose an open or "country drainage" system consisting of drainage swales or surface ditches to convey stormwater runoff from road and driveway surfaces. Such a system will only be considered on residential streets with less than 3% slope and generally permeable soils.			Conventional



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# REPORT

June 2022

TOWN OF

**West Boylston**

MASSACHUSETTS

Year 4 MS4 Permit Compliance  
Green Infrastructure Report

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## ATTACHMENTS

Attachment A – Regulatory Review Matrix

Attachment B – PVPC Model Green Streets Policy



## 1.0 INTRODUCTION

### 1.1 Regulatory Requirement

The 2016 Massachusetts Municipal Separate Storm Sewer Systems (MS4) General Permit, which came into effect on July 1, 2018, regulates discharges from small 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 must implement various Best Management Practices (BMPs) for each of the following six minimum control measures:

- Public Education and Outreach
- Public Participation/Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Stormwater Management in New Development and Redevelopment (Post-Construction Stormwater Management)
- Good Housekeeping and Pollution Prevention for Municipal Operations

As part of the minimum control measure for Post-Construction Stormwater Management, Section 2.3.6 of the 2016 MS4 Permit, regulated communities are required to assess existing local regulatory mechanisms to determine the feasibility of making the following practices allowable when appropriate site conditions exist:

- Green roofs
- Infiltration practices such as rain gardens, curb extensions, planter gardens, porous and pervious pavements, and nature-based stormwater management practices
- Water harvesting devices such as rain barrels and cisterns, and the use of stormwater for non-potable uses
- Open space preservation or cluster development practices

The purpose of this exercise is to determine if these practices are allowed or, if not, what regulatory mechanisms hinder the use of these practices. This report will recommend any changes to local regulations necessary to make these practices allowable, and will include a schedule for implementing those recommendations.

The Town of West Boylston shall implement recommendations included in this report in the specified timeframe. The status of this assessment and any planned or completed changes to the relevant regulatory mechanisms shall be reported in each MS4 annual report.

### 1.2 Applicable Regulatory Mechanisms and Assessment Procedure

The following bylaws rules & regulations, policies, and/or design standards address any hinderances to using green infrastructure for stormwater management in West Boylston and were reviewed as part of this assessment:

- Zoning Bylaws

- Subdivision Rules & Regulations

Additionally, West Boylston's Stormwater Bylaw was reviewed, but found not to include any relevant language relating to the application of green infrastructure practices in West Boylston. Each regulatory mechanism listed above was reviewed using the matrix included in Attachment A. The mechanisms were reviewed using a list of key questions in four categories, and the degree to which each mechanism addresses a key question was rated as Conventional, Better, or Best using a system based on the Local Bylaw and Regulation Assessment Tool developed by MassAudubon.<sup>1</sup> The definition for each rating is as follows:

- Conventional: The key question is not addressed, or no flexibility is allowed in design requirements.
- Better: The key question is addressed, and some flexibility is allowed in design requirements, usually by special permit. LID design practices and green infrastructure are encouraged but not required.
- Best: The key question is addressed, and flexibility in design is allowed by-right. LID practices and green infrastructure are required or incentivized.

The results of this analysis are summarized in Section 2.0. Recommended updates to the assessed regulatory mechanisms are included in Section 3.0, and a proposed timeline for implementing those updates is presented in Section 4.0.

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<sup>1</sup> [Supporting LID in Your Community, Local Bylaw and Regulation Assessment Tool, MassAudubon, 2017. https://www.epa.gov/npdes-permits/stormwater-tools-new-england#pcsm](https://www.epa.gov/npdes-permits/stormwater-tools-new-england#pcsm)

## 2.0 REVIEW OF REGULATORY MECHANISMS

The matrix included in Attachment A was used to review how West Boylston's regulatory mechanisms and design standards address the use of green infrastructure and low impact development (LID) practices in Town in the following categories:

- Provisions for Use of Green Infrastructure Stormwater Management Practices
- Rainwater Harvesting
- Green Roofs
- Preservation of Natural Areas and Limits of Disturbance

This section summarizes the results of the analysis for each category.

### 2.1 Category 1: Provisions for Use of Green Infrastructure

Category 1 includes key questions such as if bioretention areas are allowed to count toward landscaping requirements, if vegetated open channels are allowed for stormwater conveyance, or if any incentives are provided for incorporating green infrastructure in West Boylston.

Design standards for stormwater management, curbing, and sidewalks are specified in the Subdivision Rules and Regulations. Section 6.A, General Design Standards states that "Low Impact Development will be implemented where possible."

#### *Curb Bump-Outs and Bioretention*

This section was rated "conventional" because curb bump-outs are not mentioned in any of the Town's current regulatory mechanisms.

#### *Low Impact Development in Stormwater Design Standards*

This section was rated "better" because the use of LID methods is encouraged in the Subdivision Rules and Regulations, and surface and sub-surface installations are allowed to provide for adequate drainage. Section 6.E, Storm Water Management states that "Storm drains, culverts, and related installations, both surface and sub-surface, shall be designed to provide for safe unimpeded flow of natural water courses, drainage of low area along streets and to intercept water runoff along streets at intervals reasonably related to the extent, surface type and grade of the area drained."

#### *Green Infrastructure in Sidewalk Areas*

This section was rated "conventional" because green infrastructure in grass strips between the sidewalk and curb is not mentioned in any of the Town's current regulatory mechanisms.

#### *Siting of LID features*

This section was rated "conventional" because a waiver may be required if a proposed LID feature does not strictly comply with the requirements in the Subdivision Rules and Regulations. Section 8.A, Waiver of Compliance, states that "Strict compliance with the requirements of these rules and regulations may be waived when, in the judgment of the Planning Board, such action is in the public interest and not inconsistent with the intent of the Subdivision Control Law."

### *Use of Permeable Pavement*

This section was rated “better” because permeable pavement is recommended for use on sidewalks, bikeways and walking paths in the Subdivision Rules and Regulations where site conditions allow. Section 6.C, Sidewalks, Bikeways and Walking Paths states that “To the extent practicable, permeable paving (porous asphalt or pervious concrete) shall be used for sidewalks, provided the appropriate soil and slope conditions exist. When a sidewalk is constructed of permeable pavement, as approved by the Planning Board, runoff shall be directed away from the sidewalk.”

### *Stormwater Practices in Landscaping Areas*

This section was rated “better” because cul-de-sac islands are required to treat and infiltrate runoff through bioretention where applicable in the Subdivision Rules and Regulations, but bioretention is not mentioned elsewhere in any of the Town’s current regulatory mechanisms. Section 6.B, Streets, states that “Where site conditions are favorable, cul-de-sac islands shall be designed to treat and infiltrate runoff through bioretention.”

### *BMPs for Tree Planting Requirements*

This section was rated “conventional” because the use of bioretention areas, tree boxes or other BMPs is not mentioned anywhere in the Town’s current regulatory mechanisms in relation to tree planting requirements. BMPs are mentioned in the Subdivision Rules and Regulations in Section 6.F, Protection of Local Water Supply, which states that “To achieve these reductions in pollutant loads the Stormwater Best Management Practices (BMP) adopted by the Department of Environmental Protection (DEP), including those cited in the DEP Stormwater Management Policy Guidance (1996), shall be followed for all developments.”

### *Incentives for Green Infrastructure*

This section was rated “conventional” because there are no incentives in place to adopt green infrastructure in any of the Town’s current regulatory mechanisms.

### *Incentives for Vegetated Filtration of Stormwater Runoff*

This section was rated “conventional” because there are no incentives in place to filter stormwater runoff using vegetation in any of the Town’s current regulatory mechanisms.

### *Vegetated Channels*

This section was rated “better” because vegetated open channel conveyance of stormwater is allowed and design criteria is specified in the Subdivision Rules and Regulations. Section 6.E, Storm Water Management, states that “Provisions may be made to construct vegetated open channels in lieu of traditional curbs and gutters, where, in the opinion of the Planning Board, it is appropriate and reasonable. Vegetated open channels may consist of grass channels or dry swales. Grass channels are most appropriate for smaller drainage areas, mildly sloping topography, and housing density less than four (4) dwelling units per acre. Dry swales are most appropriate for high density areas. The Applicant may propose an open or ‘country drainage’ system consisting of drainage swales or surface ditches to convey stormwater runoff from road and driveway surfaces. Such a system will only be considered on residential streets with less than 3% slope and generally permeable soils. The Applicant must submit drainage and hydrologic calculations to demonstrate the system can accommodate a 10-year storm. The 100-year storm shall also be assessed for its impacts on the

proposed subdivision and adjacent and downstream properties to demonstrate there will not be unacceptable flooding conditions.”

#### *Native Vegetation Requirements*

This section was rated “conventional” because the use of native vegetation is not mentioned in any of the Town’s current regulatory mechanisms. Section 7.G, Trees of the Subdivision Rules and Regulations states that “Both the species and the location of which trees are to be planted shall be approved by the West Boylston Tree Warden”.

## 2.2 Category 2: Rainwater Harvesting

Category 2 includes key questions such as whether rainwater harvesting is allowed, where rainwater capture systems can be located, and if stormwater is allowed to be repurposed for non-potable uses in West Boylston.

The use of downspouts, rain barrels, cisterns and other methods for rainwater harvesting or non-potable stormwater use is not mentioned in any of the Town’s current regulatory mechanisms, so all sections were rated “conventional”.

## 2.3 Category 3: Green Roofs

Category 3 includes key questions such as if green roofs are explicitly allowed or prohibited and, if allowed, what design standards are in place for green roofs in West Boylston.

Green roofs are not mentioned in any of the Town’s current regulatory mechanisms, so all sections were rated “conventional”.

## 2.4 Category 4: Preservation of Natural Areas/Limits of Disturbance

Category 4 includes key questions such as if the community has an open space residential development bylaw, if there is a natural resource protection zoning district, and what restrictions are placed on development within or close to riparian or wetland buffer areas in West Boylston.

#### *Open Space Residential Development and Resource Protection*

This section was rated “better” because the Town has an Aquifer and Watershed Protection Zoning District to protect sources of drinking water supplies and a Residential Cluster Development Bylaw that provides an alternative design concept for residential subdivisions and requires protected open space. Section 2.6, Aquifer and Watershed Protection District of the Zoning Bylaws specifies permitted uses, prohibited uses, and uses requiring a special permit within the overlay district.

#### *Open Space and Cluster Design*

This section was rated “best” because the Residential Cluster Development Bylaw in the Zoning Bylaws requires that protected open space be a minimum of forty percent of the tract area. Section 3.11, Residential Cluster Development, states that the goals of the subdivision design concept is to “1.) allow Residential Cluster Development in all zoning districts where residential use is allowed, subject to Subdivision Approval. 2.) allow greater flexibility and creativity in the design of residential developments, 3.) preserve the rural character while increasing the supply of attractive housing in the Town of West Boylston, 4.) encourage the permanent protection and preservation of open space,

agricultural and forestry land, and to protect natural and/or historical resources and vistas; and 5.) encourage a greater diversity and distribution of housing to meet the needs of West Boylston residents and employees of the Town.”

#### *Maximum Yard Sizing*

This section was rated “conventional” because there is no maximum yard sizing specified in the Town’s Zoning Bylaws. Minimum lot size, frontage, and front, side and rear yard sizes are specified for each zoning district in Section 4.3, Schedule of Dimensional Requirements.

#### *Vegetated Areas on Site Plans*

This section was rated “conventional” because submitted site plans are required to include significant vegetative cover as specified in the Zoning Bylaws. Section D, Site Plan Contents and Submission Materials states that all submitted site plans shall depict “Natural features including watercourses and water bodies, tree lines, significant trees, and other significant vegetative cover, topographic features, soil properties, and any other environmental features of the landscape that are important to the site design process. Location, type, and size of all existing and proposed landscaping, screening, green space, and open space areas.”

#### *Stream Buffer and Floodplain Requirements*

This section was rated “better” because the Zoning Bylaws and Subdivision Rules and Regulations require submitted site plans and Definitive Plans, respectively, to depict all necessary floodplain and water body information and to comply with Chapter 131, Section 40 of the Massachusetts General Laws, which is consistent with regulatory requirements. Section D, Site Plan Contents and Submission Materials, states that “Submitted site plans must depict all floodplain information, including the contours of the 100-year flood elevation.”

#### *Conservation Easements for Buffer Areas*

This section was rated “better” because the Subdivision Rules and Regulations require applicants to submit a stormwater easement or drainage right-of-way to conform with any water courses, drainage ways, channels or streams that traverse a proposed subdivision. Section 6.H, Easements, states that “Where a subdivision is traversed by a water course, drainage way, channel or stream, the Planning Board shall require the Applicant to provide a stormwater easement or drainage right-of-way of adequate width to conform substantially to the lines of such water course, drainage way, channel or stream, and to provide for construction, maintenance or other necessary purposes. In the absence of engineering or physical evidence as to the extent of the drainage way, an easement shall be required encompassing 30 feet from the banks of any perennial stream and 15 feet from the bank of an intermittent stream.”

#### *Maintenance Activities in Buffer Zones*

This section was rated “conventional” because there is no language in any of the Town’s current regulatory mechanisms that restrict maintenance activities in buffer zones.

#### *Wetland Buffer*

This section was rated “better” because the Zoning Bylaws and Subdivision Rules and Regulations require compliance with Chapter 131, Section 40 of the Massachusetts General Laws which requires contacting the Town’s Conservation Commission to work in a wetland resource area or within 100 feet of a wetland. Section 6.J of the Subdivision Rules and Regulations, Protection of Natural

Features states that “Every subdivision shall comply with the requirements of the Wetlands Protection Act, M.G.L. c.131, §40, the regulation issued thereunder. If design changes are required as the result of an action or decision of the Conservation Commission pursuant to such provisions, the Applicant shall promptly notify the Planning Board. The Planning Board may condition its approval of the plan upon the issuance of an Order of Conditions by the Conservation Commission.”

#### Environmentally Critical Areas on Existing Conditions Plans

This section was rated “better” because the Subdivision Rules and Regulations require Definitive Plan submissions to contain natural features and critical environmental sources, but environmentally critical/constrained areas are not specifically mentioned in the Zoning Bylaws. Section 5.B of the Subdivision Rules and Regulations states that definitive plans must contain information to “Identify and map natural features and critical environmental resources; Delineate potential building envelopes avoiding natural features and environmental resource areas and appropriate buffers; and Develop methods to minimize impervious surfaces, and to protect and preserve open space (i.e. document LID development).”

#### *Disturbance of Existing Vegetation*

This section was rated “conventional” because vegetated buffers are required in between developments and public ways, residential uses and different districts as specified in the Zoning Bylaws but reestablishing disturbed vegetated areas is not required in any of the Town’s current regulatory mechanisms.

#### *Site Design near Slopes and Watercourses*

This section was rated “conventional” because Site Plans and Definitive Plans must depict existing and proposed topography, wetland resource areas, natural drainage courses, waterways and bodies of water, and the proposed work must comply with Massachusetts General Laws Chapter 131, Section 40, but there is no other language limiting the location of site designs in relation to slope or watercourses.

### 3.0 RECOMMENDED REGULATORY UPDATES

This section includes recommended regulatory updates identified as a result of the analysis summarized in Section 2.0. The recommended language will update West Boylston's regulatory mechanisms to meet the following goals:

- Allow and encourage green roofs,
- Allow and encourage infiltration practices and green infrastructure techniques to manage stormwater using landscaping and augmented soils,
- Allow and encourage rain barrels and cisterns to promote the use of stormwater for non-potable uses, and
- Allow for flexible site design in line with open space/cluster development practices<sup>2</sup>.

The updates recommended in this section will be implemented in the timeframes included in Section 4.0.

#### 3.1 Updates to Zoning Bylaws

The following updates to the Zoning Bylaws should be considered to meet the goals outlined above:

- Update Section 3.6D, Site Plan Contents and Submission Materials, to require showing all existing vegetative cover, and to include language prohibiting maintenance activities in buffer zones.
- Update Section 3.6E, Site Design Standards, to establish limits on allowable disturbance of vegetation or to require a percentage of existing vegetative cover to remain intact. The landscaping within setbacks and parking area landscaping sections should be updated to explicitly allow tree boxes, bioretention, and other green infrastructure to count towards landscaping and open space requirements, and to require at least 75% native plantings, or a mixture of native and non-native plantings.
- Update Section 4.3, Schedule of Dimensional Requirements, to identify maximum frontage, and front, side and rear yard sizes for each zoning district.

#### 3.2 Updates to Subdivision Rules & Regulations

The following updates to the Subdivision Rules & Regulations should be considered to meet the goals outlined above:

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<sup>2</sup> Development in which the buildings and associated roadways or parking are clustered together in one or more groups separated from adjacent property and/ or other groups within the development by intervening Dedicated Open Space usable for passive or active recreational activities (760 CMR 59.00). Massachusetts provides a model open space design/natural resource protection zoning bylaw, which emphasizes designing around the natural landscape and preserving common open space within subdivisions. This model bylaw is part of the Commonwealth's Smart Growth/Smart Energy Toolkit:

[https://www.mass.gov/files/documents/2017/11/03/Open%20Space%20Design%20\(OSD\)-Natural%20Resource%20Protection%20Zoning%20\(NRPZ\)\\_0.pdf](https://www.mass.gov/files/documents/2017/11/03/Open%20Space%20Design%20(OSD)-Natural%20Resource%20Protection%20Zoning%20(NRPZ)_0.pdf)



- Update Section 5.B, Form and Content of the Definitive Plan, to require showing all existing vegetative cover, and to include language prohibiting maintenance activities in buffer zones.
- Update Section 6, Design Standards and Section 7, Improvements to specifically allow LID and green infrastructure techniques, and to count them towards landscaping and open space requirements. These sections should also be updated to establish limits on allowable disturbance of vegetation or to require a percentage of existing vegetative cover to remain intact.
- Update Section 6.E, Storm Water Management, to encourage the use of green infrastructure including surficial retention, and to explicitly allow rainwater harvesting (downspouts to LID features, rain barrels, cisterns on rooftops, etc.) that meet all Massachusetts State Plumbing or State Building Codes with a required maintenance plan. This section should be updated to explicitly allow green roofs that meet all applicable requirements of the Massachusetts State Building Codes, and to require a maintenance plan if implemented. This section should reference the Massachusetts Stormwater Handbook and count rainwater harvesting and green roofs towards applicable stormwater requirements.
- Update Section 6.H, Easements, to require a 100-foot buffer from the banks of any perennial or intermittent stream in the absence of engineering or physical evidence of a drainage way.
- Update Section 6.C, Sidewalks, Bikeways and Walking Paths, to allow both permeable paving and permeable pavers and to reference the Massachusetts Stormwater Handbook.
- Update Section 7.D, Curbs, to explicitly allow curb bump outs where bioretention or other green infrastructure techniques may be employed.
- Update Section 7.G. Trees, to require native species, or to allow tree boxes to count towards planting requirements.

### 3.5 Other General Recommendations

- The Town should consider developing a Green Infrastructure Policy or Best Practices document to distribute to developers and consider for public improvement projects as appropriate. This document may address topics such as rainwater harvesting, green roofs, small-scale bioretention, and other green design elements typically seen on private property. It may also include incentives for incorporating these practices, such as a credit towards building permit fees or bonus floor area for designs that include a green roof.
- The Town should consider developing a Green Streets Policy. This policy would promote the incorporation of green streets practices and green infrastructure into public and private development, including road reconstruction, bicycle/pedestrian projects, stormwater improvements, new development, and redevelopment projects. This type of policy, which has been adopted by multiple communities in Massachusetts, promotes the capture and infiltration of stormwater on-site. A model Green Streets Policy Statement, developed by the Pioneer Valley Planning Commission, has been included in Attachment B for reference

#### 4.0 IMPLEMENTATION TIMEFRAMES FOR REGULATORY UPDATES

Under Section 2.3.6.b. of the 2016 Massachusetts MS4 Permit, the Town of West Boylston shall implement recommended updates to their regulatory mechanisms included in this report in the timeframes outlined in this section. The timeframes reflect the regular meeting schedule of the relevant Town departments and boards, and consider any other planned updates to the regulatory mechanisms. Implementation timeframes for the recommended updates to each document are summarized in Table 4.1.

Regulatory Mechanism	Appropriate Review Board	Complete First Draft of Updates	Complete Internal Review	Present Updates to Appropriate Review Board	Adopt Proposed Changes
Zoning Bylaws	Zoning Board of Appeals	December 2022	March 2023	May 2023	June 2024
Subdivision Rules & Regulations	Planning Board	December 2022	March 2023	September 2023	December 2023

Attachment A

Regulatory Review Matrix

Town of West Boylston MS4 Permit Compliance

Green Infrastructure Report - Regulatory Review Matrix

Key Question	Zoning Bylaw		Subdivision Rules & Regulations		Score
	Section Reference	Language	Section Reference	Language	
<b>Category 1: Adopt Green Infrastructure Stormwater Management Provisions</b>					
Are curb bump-outs allowed? Can bioretention be installed in bump-outs?			7.D, Curbs	Not mentioned.	Conventional
Do stormwater design standards promote piping and surficial retention or LID?			6.E, Storm Water Management	Storm drains, culverts, and related installations, both surface and sub-surface, shall be designed to provide for safe unimpeded flow of natural water courses, drainage of low area along streets and to intercept water runoff along streets at intervals reasonably related to the extent, surface type and grade of the area drained. Provisions may be made to construct vegetated open channels in lieu of traditional curbs and gutters, where, in the opinion of the Planning Board, it is appropriate and reasonable. The use of Low Impact Development methods is encouraged.	Better
Can GI techniques replace grass strips between the sidewalk and curb?			Section 6, Design Standards, Section 7, Improvements	Not mentioned.	Conventional
Can LID features be easily sited or do they require a waiver?			6.E, Storm Water Management, Section 8.A, Waiver of Compliance	The use of Low Impact Development methods is encouraged. A waiver may be required if a proposed LID feature does not strictly comply with the requirements in the Rules & Regulations. Strict compliance with the requirements of these rules and regulations may be waived when, in the judgment of the Planning Board, such action is in the public interest and not inconsistent with the intent of the Subdivision Control Law.	Conventional
Is permeable pavement allowed? For what uses?			6.C, Sidewalks, Bikeways and Walking Paths, 7.C, Sidewalks and Bikeways	To the extent practicable, permeable paving (porous asphalt or pervious concrete) shall be used for sidewalks, provided the appropriate soil and slope conditions exist. When a sidewalk is constructed of permeable pavement, as approved by the Planning Board, runoff shall be directed away from the sidewalk. Use of permeable pavement, as approved by the Planning Board, shall be designed in accordance with the Massachusetts Stormwater Technical Handbook (as amended) or equivalent design guidelines and specifications approved by the Planning Board	Better
Can bioretention areas and other stormwater practices count as landscaping areas?			6.B, Streets	Where site conditions are favorable, cul-de-sac islands shall be designed to treat and infiltrate runoff through bioretention. Bioretention is not mentioned elsewhere.	Better

**Town of West Boylston MS4 Permit Compliance**

**Green Infrastructure Report - Regulatory Review Matrix**

Key Question	Zoning Bylaw		Subdivision Rules & Regulations		Score
	Section Reference	Language	Section Reference	Language	
Can bioretention areas, tree boxes, and other BMPs count toward tree planting requirements?	3.6E, Site Design Standards	Not mentioned.	Section 6, Design Standards, Section 7, Improvements	Not mentioned. To achieve these reductions in pollutant loads the Stormwater Best Management Practices (BMP) adopted by the Department of Environmental Protection (DEP), including those cited in the DEP Stormwater Management Policy Guidance (1996), shall be followed for all developments.	Conventional
Are any incentives in place to adopt green infrastructure?			Section 6, Design Standards, Section 7, Improvements	There are no incentives in place. Use of Low Impact Development (LID) practices is encouraged.	Conventional
Are any incentives provided for using vegetation to filter stormwater runoff?			Section 6, Design Standards, Section 7, Improvements	There are no incentives in place.	Conventional
Is vegetated open channel conveyance of stormwater allowed? Are there established design criteria for vegetated channels?			6.E, Storm Water Management	Provisions may be made to construct vegetated open channels in lieu of traditional curbs and gutters, where, in the opinion of the Planning Board, it is appropriate and reasonable. Vegetated open channels may consist of grass channels or dry swales. Grass channels are most appropriate for smaller drainage areas, mildly sloping topography, and housing density less than four (4) dwelling units per acre. Dry swales are most appropriate for high density areas. The Applicant may propose an open or "country drainage" system consisting of drainage swales or surface ditches to convey stormwater runoff from road and driveway surfaces. Such a system will only be considered on residential streets with less than 3% slope and generally permeable soils. The Applicant must submit drainage and hydrologic calculations to demonstrate the system can accommodate a 10-year storm. The 100-year storm shall also be assessed for its impacts on the proposed subdivision and adjacent and downstream properties to demonstrate there will not be unacceptable flooding conditions.	Better
Are landscaping plans required to use less-water intensive, native vegetation?			Section 6, Design Standards, Section 7.G, Trees	Native vegetation is not mentioned in the design standards. Both the species and the location of which trees are to be planted shall be approved by the West Boylston Tree Warden.	Conventional
<b>Category 2: Rainwater Harvesting</b>					
Are downspouts allowed to be disconnected into a rain barrel or yard?		Not mentioned.		Not mentioned.	Conventional

**Town of West Boylston MS4 Permit Compliance  
Green Infrastructure Report - Regulatory Review Matrix**

Key Question	Zoning Bylaw		Subdivision Rules & Regulations		Score
	Section Reference	Language	Section Reference	Language	
Can rain barrels be placed within standard zoning setback areas?		Not mentioned.		Not mentioned.	Conventional
Can cisterns be placed on rooftops for rainwater harvesting?		Not mentioned.		Not mentioned.	Conventional
Are maintenance plans required for rainwater harvesting systems?		Not mentioned.		Not mentioned.	Conventional
Are site designs allowed to include systems that use stormwater for non-potable uses?		Not mentioned.		Not mentioned.	Conventional
<b>Category 3: Green Roofs</b>					
Do any regulations explicitly allow or prohibit green roofs?		Not mentioned.		Not mentioned.	Conventional
Are there design standards for green roofs? Do they defer to the MA State Building Code per MA Stormwater Handbook guidance?		Not mentioned.		Not mentioned.	Conventional
Are there any incentives in place for installing green roofs?		Not mentioned.		Not mentioned.	Conventional
<b>Category 4: Preservation of Natural Areas/Limits of Disturbance</b>					
Does the community have a bylaw or zoning district specifically for open space residential development or natural resource protection?	2.6, Aquifer and Watershed Protection District, 3.11 Residential Cluster Development	The Aquifer Protection District is an overlay district superimposed on the zoning districts. This overlay district shall apply to all new construction, reconstruction or expansion of existing buildings and new or expanded uses. The purpose of this Residential Cluster Development (RCD) By-law is to provide an alternative residential subdivision design concept to increase the supply of desirable housing in the Town of West Boylston, while maintaining or creating additional open spaces within the community. The Protected Open Space shall be a minimum of forty (40) percent of the tract area. Additional design standards are specified in Section 3.11.			Better

**Town of West Boylston MS4 Permit Compliance**

**Green Infrastructure Report - Regulatory Review Matrix**

Key Question	Zoning Bylaw		Subdivision Rules & Regulations		Score
	Section Reference	Language	Section Reference	Language	
Are there allowances for flexible site design incentives for open space or cluster design?	3.11 Residential Cluster Development	Accordingly, the provisions of this section are intended to: 1.) allow Residential Cluster Development in all zoning districts where residential use is allowed, subject to Subdivision Approval. 2.) allow greater flexibility and creativity in the design of residential developments, 3.) preserve the rural character while increasing the supply of attractive housing in the Town of West Boylston, 4.) encourage the permanent protection and preservation of open space, agricultural and forestry land, and to protect natural and/or historical resources and vistas; and 5.) encourage a greater diversity and distribution of housing to meet the needs of West Boylston residents and employees of the Town.			Best
Presence of maximum as well as minimum yard sizing?	4.3 Schedule of Dimensional Requirements	There is no maximum yard sizing specified. Minimum lot size, frontage and front, side and rear yard sizes are specified for each zoning district.			Conventional
Are site plans required to show the extents of existing vegetated areas?	3.6.D, Site Plan Contents and Submission Materials	All submitted site plans shall depict the following information: Natural features including watercourses and water bodies, tree lines, significant trees, and other significant vegetative cover, topographic features, soil properties, and any other environmental features of the landscape that are important to the site design process. Location, type, and size of all existing and proposed landscaping, screening, green space, and open space areas.			Conventional

Town of West Boylston MS4 Permit Compliance

Green Infrastructure Report - Regulatory Review Matrix

Key Question	Zoning Bylaw		Subdivision Rules & Regulations		Score
	Section Reference	Language	Section Reference	Language	
Are there stream buffer or floodplain requirements? Are they consistent with state regulatory requirements?	3.6.D. Site Plan Contents and Submission Materials, 2.5, Floodplain Overlay District	Submitted site plans must depict all floodplain information, including the contours of the 100-year flood elevation. The Floodplain District is established as an overlay district to all other districts. All Development in the district, including structural and non-structural activities, whether permitted by right or by special permit must be in compliance with Chapter 131, Section 40 of the Massachusetts General Laws.	5.B, Form and Content of the Definitive Plan, 6.H, Easements, 6.J, Protection of Natural Features	The Definitive plan shall include the location of all permanent existing or proposed monuments and property features, including natural objects and surfaces, including stone walls, fences, buildings, structures, historic sites, rock ridges, ledge outcroppings, large boulders, steep slopes, trees larger than 15 inches in diameter, wells, subsurface sewage disposal systems, wetland resource areas, 100-year floodplain boundaries and flood elevations, natural drainage courses, waterways and bodies of water. Where a subdivision is traversed by a water course, drainage way, channel or stream, the Planning Board shall require the Applicant to provide a stormwater easement or drainage right-of-way of adequate width to conform substantially to the lines of such water course, drainage way, channel or stream, and to provide for construction, maintenance or other necessary purposes. In the absence of engineering or physical evidence as to the extent of the drainage way, an easement shall be required encompassing 30 feet from the banks of any perennial stream and 15 feet from the bank of an intermittent stream. Every subdivision shall comply with the requirements of the Wetlands Protection Act, M.G.L. c.131, §40, the regulation issued thereunder.	Better
Are buffer areas protected by a conservation easement or other permanent restrictions?	2.5, Floodplain Overlay Districts	The Floodplain District is established as an overlay district to all other districts. All Development in the district, including structural and non-structural activities, whether permitted by right or by special permit must be in compliance with Chapter 131, Section 40 of the Massachusetts General Laws.	6.J, Protection of Natural Features, 6.H, Easements	Due regard shall be shown for all natural features, such as large trees, archeologic sites, water courses, historic sites, scenic points, and similar community assets, which, if preserved, will add attractiveness and value to the subdivision. Where a subdivision is traversed by a water course, drainage way, channel or stream, the Planning Board shall require the Applicant to provide a stormwater easement or drainage right-of-way of adequate width to conform substantially to the lines of such water course, drainage way, channel or stream, and to provide for construction, maintenance or other necessary purposes. In the absence of engineering or physical evidence as to the extent of the drainage way, an easement shall be required encompassing 30 feet from the banks of any perennial stream and 15 feet from the bank of an intermittent stream.	Better



**Town of West Boylston MS4 Permit Compliance**

**Green Infrastructure Report - Regulatory Review Matrix**

Key Question	Zoning Bylaw		Subdivision Rules & Regulations		Score
	Section Reference	Language	Section Reference	Language	
Is there language restricting maintenance activities in buffer zones?		Not mentioned.		Not mentioned	Conventional
What is the minimum required wetland buffer?	2.5, Floodplain Overlay Districts	The Floodplain District is established as an overlay district to all other districts. All Development in the district, including structural and non-structural activities, whether permitted by right or by special permit must be in compliance with Chapter 131, Section 40 of the Massachusetts General Laws.	6.J, Protection of Natural Features, 4.B, Form and Content of the Definitive Plan, 5.B Form and Content of the Definitive Plan	Every subdivision shall comply with the requirements of the Wetlands Protection Act, M.G.L. c.131, §40, the regulation issued thereunder. If design changes are required as the result of an action or decision of the Conservation Commission pursuant to such provisions, the Applicant shall promptly notify the Planning Board. The Planning Board may condition its approval of the plan upon the issuance of an Order of Conditions by the Conservation Commission. The Preliminary Plan and Definitive Plan shall contain the following information: The location and boundaries of any land subject to the protections of the Wetlands Protection Act, c.131, §40, as amended by the Rivers Protection Act, St. 1996, c.258, or the Watershed Protection Act, St. 1992, c.36, codified at M.G.L. c.92, §§104, 107A, 108, 113 and 113A;	Better
Are environmentally critical/constrained areas required to be identified as part of the existing conditions plan?	3.6.D. Site Plan Contents and Submission Materials	Environmentally critical/constrained areas are not specifically mentioned. All submitted site plans shall depict the following information: Natural features including watercourses and water bodies, tree lines, significant trees, and other significant vegetative cover, topographic features, soil properties, and any other environmental features of the landscape that are important to the site design process.	5.B, Form and Content of the Definitive Plan	The Definitive Plan shall contain the following information: Identify and map natural features and critical environmental resources; Delineate potential building envelopes avoiding natural features and environmental resource areas and appropriate buffers; and Develop methods to minimize impervious surfaces, and to protect and preserve open space (i.e. document LID development).	Better
Are there limits on allowable disturbance of existing vegetation? Is disturbance of vegetated areas required to be phased?	2.9, Continuing Care Retirement Community Overlay District	Site plan design which creates open space by using cluster principles. At least 25% of the site shall be preserved as open space and maintained as natural vegetation or landscaped areas. Use of open space, except for passive recreation, plantings, footpaths, and agriculture shall be prohibited.			Conventional
Is there a requirement to reestablish vegetated areas in disturbed open space?	2.9, Continuing Care Retirement Community Overlay District, 3.10, Incentive Zoning, 3.11, Residential Cluster Development	Vegetated buffers are required in between developments and public ways, residential uses and different Zoning districts as specified.		Not mentioned.	Conventional

**Town of West Boylston MS4 Permit Compliance**

**Green Infrastructure Report - Regulatory Review Matrix**

Key Question	Zoning Bylaw		Subdivision Rules & Regulations		Score
	Section Reference	Language	Section Reference	Language	
Is there any language requiring limiting site designs to areas of lesser slope and/or farther from watercourses?			4.B, Form and Content of the Definitive Plan, 5.B Form and Content of the Definitive Plan	The location of steep slopes, wetland resource areas, natural drainage courses, waterways and bodies of water are required to be shown on the Preliminary Plan and the Definitive Plan.	Conventional

Attachment B

PVPC Model Green Streets Policy

TOOLKIT FOR

# Green Infrastructure



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PIONEER VALLEY  
SUSTAINABILITY TOOLKIT

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# Bioretention Areas

## WHAT IT IS

Bioretention facilities (also known as rain gardens) are landscaped depressions designed with soils and a variety of plants to receive and treat stormwater through the use of natural processes. These natural processes include the uptake of water by plants and transfer of water to the atmosphere, and infiltration (or soaking up) of water into the soils where microbial action helps to breakdown pollutants and gravity pulls water further down through the soil layers to recharge groundwater. (See Figure 1)

Bioretention facilities can be used in a variety of settings: along a street edge or as an island in a parking lot to capture storm flow from asphalt or concrete surfaces; and near residential or commercial buildings to capture storm flow from roofs. Bioretention facilities are often designed with an underdrain or an overflow that directs flow to the municipal storm drain system.

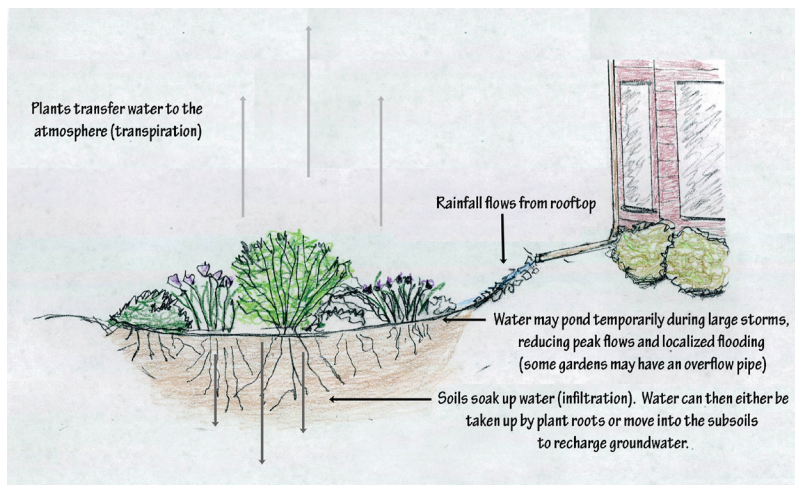


Figure 1: How a Bioretention Facility Functions

# WATER QUALITY TREATMENT

When a bioretention facility is designed with an underdrain that ultimately delivers flow to surface waters, the capacity of a facility to treat stormwater is critical. Bioretention systems have proven effective at removing many pollutants associated with stormwater: suspended solids, including particulate phosphorous, petroleum hydrocarbons, and heavy metals. The table below shows water quality treatment in the four bioretention facilities tested to date by the University of New Hampshire Stormwater Center.



A rain garden along Route 9 in Hadley, captures storm flow from a drive and parking lot. This photo is taken just after installation and before plants are really established.

Photo courtesy of Berkshire Design Group, Inc.

## Pollutant Removal in Four Bioretention Facilities at the University of New Hampshire Stormwater Center

System	Pollutant					
	Total Suspended Solids (TSS)	Total Petroleum Hydrocarbons in the Diesel Range	Dissolved Inorganic Nitrogen (NO3)	Total Zinc	Total Phosphorous	Average Annual Peak Flow
					% Removal	% Reduction
Bio I-48" depth (42" filter depth)	97	99	44	99	-	75
Bio II-30" depth (24" filter depth)	87	99	NT	73	34	79
Bio III-30" depth (24" filter depth)	91	64	44	75	NT	84
Bio IV-37" depth (24" filter depth)	83	65	42	67	NT	95

NT = no treatment | Source: University of New Hampshire Stormwater Center 2012 Biennial Report

To boost the ability of bioretention facilities to manage for nitrogen and dissolved phosphorous, researchers have been experimenting with optimizing soil mixtures and design. See discussion under “Design considerations.” Furthermore, Allen Davis of the University of Maryland has noted that bowl volume, media composition, media depth, underdrainage configuration, and vegetation type, all have roles in effectively helping to address objectives, depending on needs, be they hydrologic (peak flow mitigation, infiltration, annual hydrology, and stream stability) and/or water quality (total suspended solids and particulates, pathogen-indicator species, metals, hydrocarbons, phosphorus, nitrogen, and temperature). Information on how best to design systems according to these needs is evolving.

## DESIGN CONSIDERATIONS

For the Pioneer Valley, major design objectives for bioretention involve flow reduction and nutrient reduction. Following is some brief guidance on design considerations relative to these objectives. As noted above, bioretention design objectives that aim to address specific target pollutants are emerging. Some of the listings below under “Links to more information” provide some resources that will be useful in this regard.



## Flow reduction

Maximum volume reduction comes when bioretention facilities are located in soils that provide for good infiltration and the use of fines in the soil mix are kept to a minimum (the entry of fines into the facility should also be limited through a pretreatment element that allows for settling of particles).

Research is showing that infiltration in soils can be enhanced and preserved over time through the use of dense vegetative cover. The University of New Hampshire Stormwater Center (UNHSC) reports that of the four bioretention facilities it has studied, infiltration rates over time were optimal in the basin (Bio III) where they used a continuous dense vegetative cover. They report, "Previous studies have indicated that plant roots generally experience a 30% die back each year which aids in the development of macropores that keep soil surface infiltration capacity high over time. The data from this study suggests that the dense vegetative cover is more important than plant type for maintaining infiltration rates in vegetative systems."

## Nutrients

In designing bioretention facilities for nutrient removal, fill media selection is critical. As it breaks down organic matter typically leaches nitrogen and phosphorous and can exacerbate water quality issues. It is important to have some organic matter to aid plant growth, but limiting its use is critical for successful bioretention facilities.

## Nitrogen

Research out of the University of Maryland points to two major considerations for promoting nitrogen removal:

Creation of an anaerobic zone where microbes can use forms of nitrogen ( $\text{NO}_2$  and  $\text{NO}_3$ ) instead of oxygen for respiration – Use of a deeper media layer (3 feet minimum), media with a less permeable bottom soil layer, lower infiltration rates (1 to 2 inches per hour), and design for internal water storage, (a subsurface portion of the media that provides some storage volume) are all important design components. In a 2003 study, he found that adding a suitable carbon source, particularly newspaper, to the gravel layer provides a nutrition source for the microbes, enables anaerobic respiration, and can enhance the denitrification process. Davis et al noted that while organic matter should be kept to very modest amounts to avoid leaching of nitrogen as it breaks down, there should be about 5% of total weight or 10% of total volume of organic matter to provide carbon sources. Postconstruction carbon can be supplied from plant roots, leaf litter, and of course the mulch as it breaks down.

More dense planting of vegetation with sizeable root masses (but not so aggressive so as to pose a threat to clogging underdrains) – Deeply rooted grasses, notes Davis et al, are expected to provide good performance. Note that in research at the UNHSC, nitrogen removal was poorest in the bioretention system that had a 60% sand mixture and wooded vegetation as compared to the sister system that had an Eco-Lawn.

## Phosphorous

Media selection is the major considerations for promoting phosphorous removal in bioretention facilities. While modest amounts of mulch can be used, Davis et al recommend selecting media with high P-sorption potential, including iron and aluminum rich soils and iron and aluminum based water treatment residuals (a byproduct of drinking water treatment), which could be used as amendments.

Inclusion of vegetation within a bioretention facility also helps to promote phosphorous removal.

## RELATED CONSIDERATIONS

General design considerations noted by the U.S. EPA National Pollutant Discharge Elimination System (NPDES) Stormwater Menu of BMP's include:

**Drainage Area** – Bioretention facilities should usually be used on small sites (five acres or less). When used to treat larger areas, they tend to clog. In addition, it is difficult to convey flow from a large area to a bioretention facility.

**Pretreatment** – Incorporating pretreatment helps reduce the maintenance burden of bioretention and reduces the likelihood that the soil bed will clog over time. Several mechanisms can be used to provide pretreatment in bioretention facilities. Often, runoff is directed to a grass channel or filter strip to filter out coarse materials before the runoff flows into the filter bed of the bioretention facility. Other features include a pea gravel diaphragm, which acts to spread flow evenly and drop out larger particles.

**Slope** – Bioretention facilities are best applied to relatively shallow slopes usually at five percent. A sufficient slope is needed at the site to ensure that water that enters the bioretention area can be connected with the storm drain system. These particular stormwater management practices are most often applied to parking lots or residential landscaped areas, which generally have shallow slopes.

**Landscaping** – Landscaping is critical to the function and aesthetic value of a bioretention facility. Native vegetation is ideal for planting. Another important feature is to select species that can withstand the type of hydrologic system it will experience. At the bottom of the bioretention facility, it is important to have plants that can tolerate both wet and dry conditions. Along the edges, it will remain primarily dry, so upland species will be the most resilient to this type of condition.

## MAINTENANCE CONSIDERATIONS

When properly designed, maintenance of these systems is minimal. UNHSC notes, "... the highest maintenance burden occurs during the first two years of operation as the vegetation grows and the system begins to stabilize." Once vegetation is established, maintenance is comparable to what is required for standard landscaping. (UNHSC, 2012 Biennial Report)

Systems with fine soils may need more cleaning due to obstruction from sediment. Long-term maintenance mainly requires inspection and scraping of surface pollutants.

## PERMITTING CONSIDERATIONS

In the Massachusetts Stormwater Handbook, Volume 1 under Stormwater Management Standard #6, stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply. Discharges within Zone II require the use of a treatment train that provides 80% TSS removal prior to discharge. Bioretention facilities are a good fit for discharges within Zone IIs as they have a TSS removal rate of 90%. In addition, under the Massachusetts Stormwater Handbook, Volume 2, Chapter 2, bioretention facilities are a good option for discharges near cold-water fisheries. However, these should not be developed near bathing beaches and shellfish growing areas.

# BARRIERS TO USE

Concern	Experience
Cost	<p>The cost of installing a bioretention facility can vary greatly. A “do it yourself” bioretention facility that captures flow from the roof of a single family home and where soils are well draining can cost as little as a hundred dollars with a simple planting scheme.</p> <p>Engineered systems can cost \$4 to \$6 per square foot, including the grading, underdrain, stone, and plants. An estimate from the University of New Hampshire Stormwater Center (UNHSC) provides a cost based on per acre of impervious surface draining to the facility that ranges from \$14,000 and \$25,000 per acre, not including design, permitting, or construction oversight costs.</p> <p>UNHSC further notes that in 2007 they installed a bioretention system in a parking lot median strip as a retrofit. It cost a total of \$14,000 per acre, including \$8,500 per acre for labor and installation, and \$5,500 per acre for materials and plantings. “These finding indicate that for municipalities with equipment and personnel, the retrofit costs are nearly \$5,500 per acre of drainage.” (University of New Hampshire Stormwater Center 2012 Biennial Report)</p>
Accumulation of toxics	<p>Stormwater flow from roadways and parking lots typically carries a mix of pollutants. Where bioretention facilities are used to receive, capture, and treat these flows, do facilities become toxic? Lisa Stiffler, a researcher with the Sightline Institute, a Seattle based think tank, has been investigating. She has found the following:</p> <p>Petroleum pollutants/PAHs: Studies from the field and laboratory find that rain gardens do a great job of capturing petroleum pollution, and that the chemicals are largely eliminated when they are destroyed by bacteria in the soil.</p> <p>Heavy metals: Soil and mulch in rain gardens contain particles that will adsorb and hold metals including copper, cadmium, lead, and zinc. A small fraction of the metals are sucked into plant roots and vegetation. When Northwest counties test for metals in the sediment that is scooped from the bottom of stormwater ponds or rain gardens that drain parking lots and other city surfaces — material that would likely have higher levels of metals than your average residential rain garden — they found that the contamination levels were still below soil and compost standards meant to protect human health.</p> <p>Bacteria and viruses: While some research has found bacteria and viruses in stormwater that can cause disease in humans, sunlight as well as other microorganisms in the runoff and soil of rain gardens can destroy the pathogens. Also, most of the microorganisms present come from animal waste and are less likely to cause illness in people.</p> <p>The bottom line is that the soil in rain gardens is safe for kids and pets. That said, people are advised to wash their hands after working or playing in any soil, which can contain naturally occurring metals, fecal waste from pets, or any number of compounds one would not want to ingest.</p>



Snow management	<p>If used in conjunction with parking lots or roadways, bioretention facilities should be designed to make for easy movement of plows. Planning a plow path and telling snow plow operators where to push the snow is important in keeping snow out of bioretention areas.</p> <p>According to the Massachusetts Stormwater Handbook (Vol. 2, Ch. 2), never store snow in bioretention facilities. The operation and maintenance plan must specify where on-site snow will be stored. A major reason for this is that infiltrating capabilities will become impaired due to fines that remain once snow melts.</p>
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## EXAMPLES OF WHERE STRATEGY HAS BEEN IMPLEMENTED

### Veterans Affairs Medical Center, Northampton, MA

Three rain gardens at the Northampton Veterans Affairs Medical Center enhance drainage through infiltration of rainfall and snowmelt, and improve aesthetics and habitat values with extensive native plantings. The three rain gardens are part of a campus rain garden master plan.

The rain garden below on the right captures flow from a 1,200 square foot area of roof. The rain garden shown below, includes a “level spreader” built of stone at the top of the system to ensure that storm flow distributes evenly across the basin and does not cause gullies or erosion. This garden below receives flow from a 1,600 square foot area of roof.



Photos courtesy Thomas Benjamin

# Downspout Disconnection

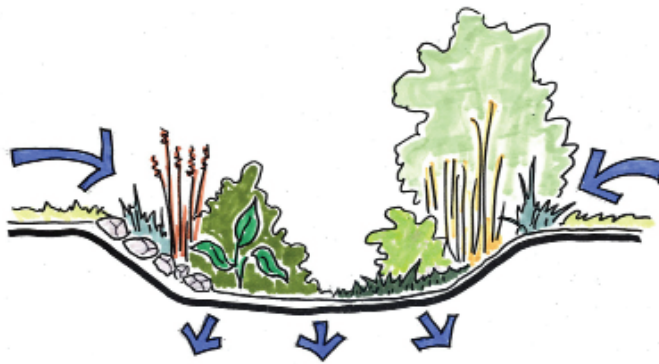
## PURPOSE

**Establishing a municipal downspout disconnection program provides support for a simple, low cost and low maintenance green infrastructure practice to reduce the amount of runoff entering the municipal storm or combined sewer system, thus reducing the occurrence of combined sewer overflows and associated water pollution.**

The purpose of a municipal downspout disconnection program is to identify and disconnect those downspouts (also called roof leaders) that discharge into the sanitary sewer system, thereby reducing peak storm flows and associated combined sewer overflows (CSO). Sometimes, downspouts may not be directly plumbed into the sewer, but flow onto contiguously connected impervious areas such as driveways and parking lots, which drain to storm drains in the street. Under both circumstances (direct connection or overflow), redirecting downspouts to vegetated areas such as lawns or rain gardens is a recommended best practice.

In a 2011 study conducted by the Center for Watershed Protection, researchers evaluated runoff reduction at downspout disconnections to six urban residential lawns in the City of Baltimore, Maryland with C-type soils (less cohesive granular soils). On average, runoff reduction was high with an average reduction of 95% for the 1-inch rainfall event, and an average reduction of 90% for the 2-inch rainfall event. Numerous factors affect runoff reduction including soil type, age of lawn, slope, organic matter content, and management practices. The study noted that D-type (or compacted soils) would have resulted in less runoff reduction.

Rain gardens are an attractive alternative to lawn and allow 30% more water to soak into the ground than a conventional lawn (Wisconsin Department of Natural Resources, 2003). In addition to their ability to retain and infiltrate runoff, they provide important habitat for bees, butterflies and birds in urban and suburban areas.



SOURCE: [www.GroundworkAppliedDesign.com](http://www.GroundworkAppliedDesign.com)

## DESIGN CONSIDERATIONS

The physical disconnection is relatively simple as illustrated below, however there are a number of design considerations that need to be factored into a project.

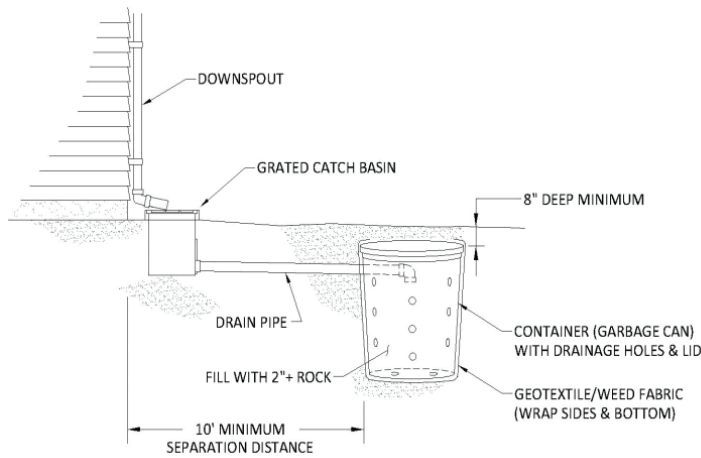
- » Evaluate soil type at the site to determine the type of on-site infiltration that will be most effective. Small highly compacted sites, or sites underlain with clay may not be feasible for on-site infiltration.
- » Direct downspout disconnections away from the basement foundation. Make sure downspout extensions end at least three feet away from basement foundations, and water is being directed on ground that slopes away from the building, however do not disconnect downspouts on slopes greater than 10%.
- » Downspout disconnections can redirect flows to vegetated areas such as a lawn or rain garden where there is the capacity for water to infiltrate into the ground.
- » Alternatively, a disconnected downspout can be plumbed into an underground drywell, gravel pit or trench where water is stored and slowly infiltrates into the ground.
- » Do not allow water to splash or pond on adjacent property. Infiltrate all water on site.
- » Do not redirect water to paved walkways and driveways as it will cause icing in the winter and unsafe conditions for pedestrians.



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A subsurface infiltration chamber can be built from a variety of materials. Key components include pipe, a perforated storage chamber, stone, and filter fabric.

SOURCE: Fairbanks Green Infrastructure Group [www.fairbankssoilwater.org](http://www.fairbankssoilwater.org)

## HOW TO DISCONNECT A DOWNSPOUT

### Step 1: Observe Your Site

It is important to understand where runoff from your downspouts go, including your house, garage, and other covered surfaces. Identify the location of downspouts and roof line, and estimate the square footage of your roof area. Map out areas in your yard for infiltration down slope of structures where you might disconnect downspouts.

### Step 2: Design Your Disconnection

Make sure you have enough landscaped area for rain to soak safely into the ground. The ground area must be at least 10% of the roof area that drains to the disconnected downspout.

roof area	sizing factor	landscapes area size
500 sq. ft. X 10% =		50 sq. ft. (5'x10')

### Step 3: Disconnect and Redirect

Cut off the downspout above the old connecting pipe. Cap or plug the top of the pipe. Fittings can be either approved adapters or blind plugs. These are available at most plumbing supply stores. Secure the cut downspout to the wall with a bracket. Next, install an elbow and extension to carry water away from the house. Add a concrete “splash pad” at the ground where the water spills from the downspout onto the lawn to prevent erosion, or landscape the area with stone, or install a rain garden to infiltrate the runoff water.





## Step 4: Maintenance

Proper maintenance of your gutters, downspouts, and landscaping can reduce problems.

- » Clean gutters at least twice a year, and more often if you have overhanging trees.
- » Make sure gutters are pitched to downspouts, and repair low spots.
- » Check and clear elbows or bends in downspouts to prevent clogging.
- » The ground should slope away from the structures. Don't build up soil, mulch, or other landscaping materials against the foundation and siding.
- » Avoid draining water onto impermeable plastic weed block or cloth.
- » Maintain healthy vegetation (lawn or rain garden plants) in the drainage area to minimize erosion and promote optimum infiltration.

## DEVELOPING A MUNICIPAL DOWNSPOUT DISCONNECTION PROGRAM

Some examples of successful municipal downspout disconnection programs are provided below. However, it is important to understand key program components so that a missing element does not become a barrier to program implementation.

### Local Policies and Regulations

Municipalities should adopt a local policy or regulation prohibiting downspout connections and establishes a local program with standards and incentives for downspout disconnection and on-site infiltration. Such a program may not be appropriate in neighborhoods where soils are not suitable for infiltration. Neighborhoods with combined sewers are high priority areas for downspout disconnection programs. Soil suitability for infiltration should be assessed in these neighborhoods prior to implementing a program.

Stormwater plumbed into the sanitary sewer can not only cause combined sewer overflows, but it increases the volume of water to be treated at the waste water treatment plant at an expense to the municipality. Clean roof runoff does not need the level of treatment sewage receives at a treatment plant. By reducing the volume of water being treated at the plant, the municipality saves money that can be used to support other infrastructure needs.

See local examples below for more information on funding and operating a downspout disconnection program.

## Education and Outreach

Public service announcements, community meetings, YouTube videos, brochures, and financial incentives have proven very important to successful programs. Ongoing education to residents about the benefits of disconnection and redirection, and alternative uses of stormwater such as rainwater harvesting for irrigation or greywater, cannot be overlooked. This means adequate funding is needed for dedicated staff, outreach materials, and possibly materials such as a downspout disconnection kit or a drywell for infiltration.

## Technical Support

All successful downspout disconnection programs provide a licensed plumbing contractor to perform the work at no cost to the homeowner. Alternatively, the homeowner can do the work themselves or hire a licensed plumber at their own expense, sometimes from a pre-approved list of contractors provided by the City. If a homeowner chooses not to use a city contractor, or a pre-approved contractor, a site inspection is performed upon completion to ensure compliance with local sewer regulations and/or plumbing codes. In some cases, dye testing may be needed to determine if a downspout is connected to or has been properly disconnected from the sanitary sewer.

## Funding Sources

Funding sources are typically derived from one of the following or a combination thereof: sewer rates, stormwater utility fees, and State Revolving Fund (SRF). Dedicating funding to downspout disconnection from any of these sources is identified in planning phases such as I/I studies and master plans, capital improvement plans, or through enforcement proceedings such as Administrative and Court Orders.

# DISCONNECTION PROGRAMS – LESSONS LEARNED

## City of Portland, Oregon

The City of Portland, Oregon's Department of Environmental Services operated a very successful downspout disconnection program from 1993 to 2011, disconnecting more than 58,000 downspouts at a total cost of \$13 million, inclusive of disconnection construction, staffing, and outreach materials and media. The program was funded solely from their sewer and stormwater utility fee, established in 1977. Some key lessons learned include:

- » **Scale Matters** – The program targeted a large geographic area to reduce CSOs to the Columbia, Slough and Willamette Rivers. To do this successfully, they used a simple technique for disconnection that was conservatively applied to only downspouts that could be disconnected safely.
- » **Downspout Disconnections Only Tool in the Toolbox** - They did not build rain gardens or other systems, seeking as much benefit as simply as possible. If a downspout disconnection could not be done safely, they didn't do it.

- » **Build Trust with Consistent Messaging** – Consistent and persistent messaging through targeted and direct outreach to homeowners helped build trust in the community and grow the program. Homeowners were slow to sign up at first, but the program's reputation for working well with property owners and careful attention to site details encouraged others to participate.
- » **Financial Incentives are Important** - Homeowners could earn \$53 for each downspout disconnection toward the stormwater portion of their city utility bill. Homeowners could have their downspouts disconnected for free by a licensed and bonded plumber under contract with the City, do it themselves, or utilize one of the volunteer community groups trained by the City. All sites were inspected after disconnection by the City. Later, the City also established the Clean River Rewards program which offered on-going discounts on utility bills for other on-site stormwater management options.
- » **Keep Risk Low** – High safety standards meant some downspouts could not be disconnected without risk of onsite flooding or harm to workers performing disconnection.

## Boston Water and Sewer Commission

The Boston Water and Sewer Commission's (BWSC) downspout disconnection program was established 25 years ago as a component of their combined sewer separation. Through numerous Infiltration and Inflow Studies, the Commission identified neighborhoods and individual properties with downspouts connected to the combined or sanitary sewer, and initiated direct outreach to property owners about disconnecting their downspouts. Homeowners may choose to allow a contractor hired by BWSC to disconnect the downspouts at no cost to the homeowner, or the homeowner may hire a licensed plumber to disconnect at the owner's expense. The program has disconnected downspouts on 39,000 buildings, and estimates to have disconnected over 75,000 downspouts.

Funding sources have varied over the course of the program. In general, funding has been provided by the Metropolitan Water Resources Authority (MWRA), which gets its funding for sewer separation projects from SRF. MWRA operates the regional Deer Island Waste Water Treatment Plant. The funding structure has varied from full coverage to a cost share depending on different factors over time including the phase of separation, funding levels, and whether the project was located in a combined or separated sewershed. BWSC's portion of the cost share structure has come from their sewer rates revenue.

To support the sewer separation program, the City adopted a Sewer Use Regulation in 1998 prohibiting downspout connection to the combined sewer and requiring disconnection. The program saves BWSC money by reducing the volume of water it sends to the Deer Island Wastewater Treatment Plant, and supports MWRA's mandates to eliminate CSOs. More about this program can be viewed here:

<http://www.bwsc.org/SERVICES/Programs/downspout/downspout.asp>

## REFERENCES AND RESOURCES

CITY OF PORTLAND, OREGON ENVIRONMENTAL SERVICES. HOW TO MANAGE STORMWATER: DOWNSPOUT DISCONNECTION.

[www.cleanriverspdx.org](http://www.cleanriverspdx.org)

LAW, NEELY AND DANA PUZEY. DOWNSPOUT DISCONNECTION STUDY SHOWS GREAT POTENTIAL FOR RUNOFF REDUCTION ON SMALL URBAN LAWNS. CENTER FOR WATERSHED PROTECTION WINTER NEWSLETTER, 2012.

UNIVERSITY OF CONNECTICUT. RAIN GARDENS: A DESIGN GUIDE FOR CONNECTICUT AND NEW ENGLAND HOMEOWNERS.

[www.nemo.uconn.edu/raingardens/](http://www.nemo.uconn.edu/raingardens/)

UNIVERSITY OF WISCONSIN EXTENSION. RAIN GARDENS: A HOW-TO MANUAL FOR HOMEOWNERS. 2003

<http://dnr.wi.gov/topic/shorelandzoning/documents/rgmanual.pdf>

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# Green Roofs

## PURPOSE

**Green roofs decrease greenhouse gas emissions caused by heating and cooling systems by making buildings more energy efficient through the installation of roofs with vegetation, soil, and membrane layers.**

In recent years, green roofs have gone from a horticultural curiosity to a booming growth industry, primarily because the environmental benefits of extensively planted roofs are now beyond dispute. Whether for industrial or governmental complexes or private homes, in urban or suburban settings, green roofs provide many benefits to buildings, neighborhoods and municipalities including:

- » Reduce stormwater infrastructure needs and costs by retaining 25 to 90% of precipitation (seasonally dependant).
- » Insulate buildings by reducing heat loss (winter) and heat gain (summer) through the roof.
- » Provide new opportunities for urban agriculture, or the creation of community gardens.
- » Significantly reduce sound levels from sources such as traffic or airplanes.
- » Protect roof membrane resulting in longer material lifespan and decreased maintenance and savings in replacement costs.
- » Provide amenity space for day care, meetings, and recreation.
- » Provide aesthetic appeal, increasing property value and the overall marketability of the building, particularly for accessible green roofs.
- » Reduce 'urban heat island effect' in the summer

## PROMOTING GREEN ROOFS IN THE PIONEER VALLEY

Communities can adopt local zoning incentives or provide financial incentives through municipal stormwater fee reductions, tax credits and grant programs to encourage the installation of green roofs on new and existing buildings. Examples of zoning incentives include density bonuses (typically in the form of floor area ratio (FAR) bonuses) or a reduction in parking requirements. Some cities in the United States have taken steps to mandate that all new privately-owned large buildings (typically over 50,000 sq/ft) meet LEED Certified standards, which require green roofs. Few municipalities actually require projects to achieve LEED certification.

The U.S. is far behind other countries in adopting strategies to support the installation of green roofs. Germany has emerged as the world leader not only in developing green roof technologies and systems, but in passing federal and state legislation to mandate green roofs under specific conditions and offering economic incentives to install them. The state of Nordrhein-Westfalen, for example, pays €15.00 per square meter (\$19.40/10.8 square feet) to individuals who install them, while other states offer similar programs. (Snodgrass, 2006)

## ENVIRONMENTAL BENEFITS

Improved air and water quality are two important environmental benefits to green roofs. The plants and growing medium of a green roof absorb water that would otherwise become runoff, thereby reducing peak storm flows and reducing associated water pollution. Research indicates that peak flow rates are reduced by 50% to 90% compared to conventional roofs. The characteristics of the soil substrate have a major influence on the effectiveness of a green roof. The soil layer traps sediments, leaves and other particles, thereby treating the runoff before reaching an outlet. The water retention capacity of the soil is dependent upon both the properties of the soil substrate and the vegetative cover. For example:

- » 1-inch deep moss and sedum layer over a 2-inch gravel bed retains about 58% of the water
- » 2.5-inch deep sedum and grass layer retains about 67% of the water
- » 4-inch layer of grass and herbaceous vegetation retains about 71% of the water

When incorporated into a combined sewer overflow abatement strategy, green roofs can reduce the need for sewer separation or storage projects required to reduce the volume and frequency of combined sewer overflows. (MA DEP and Low Impact Development Center)

The insulation provided by a green roof improves the cooling and heating efficiency of a building. By reducing energy demand for these functions, green roofs reduce air pollution and greenhouse gas emissions associated with energy production. Additionally, by reducing roof temperatures, green roofs slow the formation of ground-level ozone. Vegetation on a green roof can remove particulate matter and gaseous pollutants including nitrogen oxides, sulfur dioxide, and carbon monoxide from the air. They also remove carbon dioxide and produce oxygen. (MA DEP)

## DESIGN CONSIDERATIONS

### What is the purpose of the green roof?

Identifying a green roof's purpose and incorporating that into the early stages of planning and design is critical. All of the end uses may be compatible (stormwater retention, temperature management, community garden), but each requires different design and structural emphases and will significantly impact how the roof looks and functions, including what vegetation will cover it.

### Load-bearing Considerations

Load bearing is the most critical consideration for any green roof. There are no regulatory barriers to building a green roof per se. Structural engineers assess loads from two general perspectives: dead and live loads. Local building codes usually specify a roof's required live load, which includes snow, water, wind, and safety factors required for the building's performance. Live load also includes human traffic, temporary installations such as furniture or maintenance equipment, and anything else transient in nature. Dead load includes the weight of the roof itself, along with permanent elements that make up the roof's structure, including roofing layers, any permanent installations for heating and cooling, and the projected wind or snow loads. Green roofs must be designed to withstand both live and dead loads. Additionally, because extensive green roof systems must be evaluated while fully saturated – which adds from 15 to 25 pounds per square foot – this must also be factored in. (Snodgrass, 2006)

### Components of the Green Roof

The term green roof actually denotes a system of comprising several components, or layers, that work together to function as a single combined unit. While a green roof can be built on a variety of decking surfaces including concrete, steel, wood, and composite, the system is only possible when other components are added to ensure that the roof is protected against collapse and degradation and several other conditions are met. The basic components include: decking, waterproofing layer, and insulation layer, a root barrier, a drainage layer, a filter layer, and a substrate or medium layer.

## Vegetation and Plant Selection

The act of growing plants under atypical conditions necessarily influences their selection and maintenance in ways that differ from considerations for ground-level plants. Selecting the right plants is one of the foremost challenges. For example, without irrigation and at least 8 inches of mostly organic medium, most green roofs in North America cannot sustain a wide variety of plant species that appear in traditional gardens. (Snodgrass, 2006) Solar orientation will affect plant growth, and may be particularly important on sites with extreme slopes that have the potential to shade a roof.

### Jones Ferry River Access Center Green Roof, Holyoke, MA

This green roof includes is 13,000 square foot roof built to reduce and treat stormwater runoff, improve energy efficiency within the building lowering heating and cooling costs, reduces rooftop noise and improve air quality. The building was designed to accommodate the roofing system, including a sturdier roof framing, a thick EPDM membrane for waterproofing the roof.

The six inches of growth media is an engineered blend of carefully selected materials designed to be light weight while providing superior moisture retention. It's superior to regular soil because it is lighter, free from pathogens, undesirable insects and weeds. The roofing system will weigh between 20-25 pounds per square foot saturated with water. On an annual average, 50%-80% of all stormwater that falls on the roof is retained and not released to the storm sewer system.

In a completely dry state, the R-Value of the roof garden is approximately 6. However, the higher the moisture content of the assembly, the lower the R-Value, as thermal conductivity increases. Plants function as small water pumps operating at high pressure and low volume. When materials experience a phase change from liquid to vapor, they absorb a large of amount of heat energy from the surrounding environment. In the case of water, every gallon transpired by the plants absorbs roughly 8,000 BTU's of heat energy. As a result, during hot summer days, the roof membrane temperature is typically 5-10°F cooler than the ambient air temperature. The plants, mostly sedum acclimated to grow in this area, also stabilize the growth media and absorb stormwater.



# MUNICIPAL INCENTIVE PROGRAMS FOR GREEN ROOFS

## Portland, Oregon

The City of Portland offers a Floor Area Ratio (FAR) bonus to developers who build rooftop gardens or Ecoroofs in certain districts of the city. The ratio of the FAR bonus varies, depending on the percentage of the total building roof that the Ecoroof or rooftop garden covers. The City also funds up to \$5 per square foot of an 'ecoroof' project through their Ecoroof Incentive Program, which runs to 2013.

## Chicago, Illinois

The City of Chicago's "Green Permit Process" offers qualifying projects, such as green roof projects, an expedited permit process and possible reduction of the permit fees.

## Minneapolis, Minnesota

The City of Minneapolis charges property owners for management of stormwater based on the degree to which their property is covered by impervious surfaces. Property owners could qualify for fee reductions of up to 100% by establishing onsite water-quality and/or quantity treatment systems, such as rain gardens, detention ponds and green roofs.

## Toronto, Canada

The City of Toronto instituted a "green roof bylaw" that requires green roofs for all new development above 21,500 sq/ft. Coverage requirement range from 20-60% of the available roof space depending on the size of the development.

## Acton, Massachusetts

The Town of Acton adopted a zoning by-law allowing for a density bonus for buildings achieving LEED certification in the East Acton Village District.

## Portsmouth, New Hampshire

The City of Portsmouth adopted a density bonus for private projects that use LEED in the central business district by which a project benefits from a 0.5 increase in FAR if it meets appropriate open space requirements and build to LEED Certified standards.

## Los Angeles, California

The City of Los Angeles requires all privately owned buildings in the city with more than 50 units or over 50,000 sq/ft to meet LEED Certified standards. Additionally, all City of Los Angeles building projects that are 7,500 sq/ft or larger are required to meet LEED standards.

## REFERENCES AND RESOURCES

U.S. GREEN BUILDING COUNCIL, GREEN BUILDING INCENTIVE STRATEGIES:  
[www.usgbc.org/DisplayPage.aspx?CMSPageID=2078](http://www.usgbc.org/DisplayPage.aspx?CMSPageID=2078)

TOWN OF ACTON ZONING BYLAW (SECTION 5.5B.2.2.D):  
<http://www.acton-ma.gov/>

CITY OF PORTLAND ECOROOF PROGRAM:  
<http://www.portlandonline.com/bes/index.cfm?c=44422>

CITY OF LOS ANGELES GREEN LA INITIATIVE:  
[www.ladwp.com/ladwp/areaHomeIndex.jsp?contentId=LADWP\\_GREENLA\\_SCID](http://www.ladwp.com/ladwp/areaHomeIndex.jsp?contentId=LADWP_GREENLA_SCID)

CITY OF CHICAGO GREEN PERMIT PROCESS  
[www.cityofchicago.org/city/en/depts/bldgs/supp\\_info/overview\\_of\\_the\\_greenpermitprogram.html](http://www.cityofchicago.org/city/en/depts/bldgs/supp_info/overview_of_the_greenpermitprogram.html)

CITY OF MINNEAPOLIS STORMWATER PROGRAM:  
<http://www.ci.minneapolis.mn.us/stormwater/green-initiatives/>

CITY OF TORONTO GREEN ROOFS PROGRAM:  
<http://www.toronto.ca/greenroofs/>

Snodgrass, Edmund C. and Lucie L. Snodgrass. *Green Roof Plants: A Resource and Planting Guide*. Timber Press, 2006.

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# Green Streets

## PURPOSE

**Green streets are designed to treat and infiltrate stormwater close to its source while creating more vibrant and livable communities.**

Stormwater runoff from streets, roads, parking lots, roofs and other impervious surfaces is a significant source of water pollution to our rivers, streams and ponds, as well as a major contributor to combined sewer overflows. Green streets can provide cost effective infrastructure solutions to reduce and manage stormwater runoff and flooding through the use of green infrastructure facilities – small, decentralized, natural or engineered systems that utilize soils and vegetation as a primary treatment mechanism. This approach integrates the built and natural environment, introducing park-like elements that enhance the pedestrian experience.

## GREEN STREETS PRINCIPLES

Green streets are designed utilizing three guiding principles:

### **Green Infrastructure – Use naturalized systems to treat and manage stormwater close to its source.**

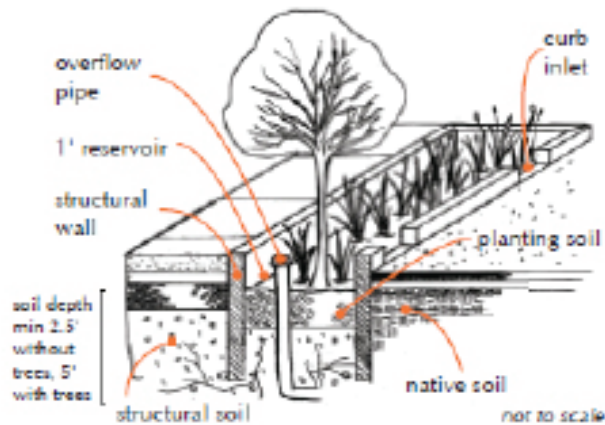
Green infrastructure (GI) uses naturalized systems to infiltrate, evapotranspire, and/or recycle stormwater runoff close to its source. Rain gardens, bioretention areas, tree box filters/trenches, green roofs, bioswales, permeable pavement, and street trees are some common GI practices. In addition to vegetation and engineered soils, GI uses permeable surfaces to intercept rain and snow melt close to the source, reducing the burden on traditional grey infrastructure systems. GI facilities seek to complement rather than replace existing grey infrastructure to achieve some of the additional benefits green streets have to offer a community.

### **Complete Streets – Create bicycle and pedestrian friendly streets.**

Complete Streets are designed for all users regardless of age, ability, income, or mode of transportation, and prioritize the health, safety, and comfort of residents and visitors. Through the use of designated bike lanes, safe pedestrian crossings, traffic-calming elements, and accessible transit systems, Complete Streets create healthier, more pleasant streetscapes that offer opportunities to walk and bicycle safely every day.

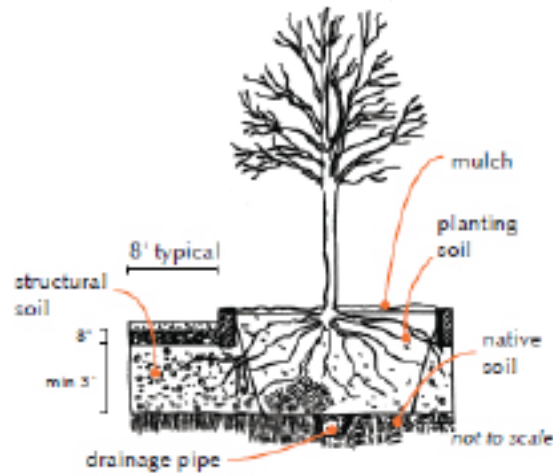
## Placemaking – Generate a strong sense of place.

Placemaking is about strengthening the connection between people and the spaces they share. In this way, spaces are created that reflect the identity and history of residents, taking a number of forms from pocket parks to participatory art projects to human-scale built environments. Good public spaces can be both temporary and seasonal, as in a Saturday morning farmer’s market on a local street closed to vehicular traffic, to permanent parks, plazas and boulevards. Placemaking can increase positive interactions between people, instill community pride, improve quality of, beautify a place, and support economic growth.



### STORMWATER PLANTER

A stormwater planter is usually a rectangular, vegetated planter, sometimes planted with trees. Its four concrete sides double as a curb and structure for the planter and allow water to pool up to 1’ before overflowing into another planter or the grey infrastructure system, storing and infiltrating water over time.



## BREAKOUT

Break-outs are excavated areas filled with structural soil, often under sidewalks or roads. Used in combination with other green infrastructure tools such as tree trenches or stormwater planters, break-outs provide more room for tree roots to grow in tight spaces, increasing the longevity and survival rate of urban trees.



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## ADOPTING A GREEN STREETS POLICY

Adopting a municipal Green Streets Policy demonstrates a community's commitment to achieving the principles identified above in both private and public projects. The following are examples of Green Street Polices from cities around the country:

### Northampton, Massachusetts – Green Streets Policy

Northampton has developed a Green Streets Policy statement which promotes the use of green streets facilities and green infrastructure in public and private development, including:

- » Road reconstruction, new road development and bicycle and pedestrian projects;
- » Stormwater projects, and;
- » New development and redevelopment projects

through regulation, capital investment and management mechanisms as a cost effective and sustainable practice for stormwater management.

### Prince George's County, Maryland – Complete and Green Streets Policy

The County requires road, sidewalk, trail, and transit related construction/reconstruction projects to include environmental site design where practicable.

### District of Columbia – Green Streets Policy

The District of Columbia's stormwater rules and the Department of Transportation's Low Impact Development Action Plan inform the City's Green Streets Policy.

### Cleveland, Ohio – Complete and Green Streets Ordinance

The purpose of the ordinance is to the creation of a network of Complete and Green Streets that will improve the economic, environmental, and social well-being of the city.

### Tucson, Arizona – Green Streets Policy

Tucson's policy requires stormwater harvesting features to be integrated into all publicly funded roadway development and redevelopment projects.

### Holyoke, Massachusetts – Green Streets Guidebook

The City's Guidebook is intended to introduce city planners and policy makers to Green Streets, advocate for Green Streets implementation in Holyoke, and serve as a preliminary set of design guidelines to transform Holyoke's streets into more ecologically, socially, and economically positive spaces. The Guidebook includes a Toolbox with design standards for Green streets strategies; nine design templates representative street characteristics in Holyoke that can be applied to future projects; a site-specific application of Green Street design principles in downtown Holyoke; an exploration of relative costs and benefits; and recommended next steps for the city to implement Green Streets.

## Edina, Minnesota – Living Streets Policy

The policy enables the City to implement their Living Streets Plan for safe walking, bicycling and driving, reduced stormwater runoff, reduced energy consumption, and promoting health.

## REFERENCES AND RESOURCES

CITY OF SEATTLE, RIGHT OF WAY IMPROVEMENTS MANUAL: GREEN STREETS  
[http://www.seattle.gov/transportation/rowmanual/manual/6\\_2.asp](http://www.seattle.gov/transportation/rowmanual/manual/6_2.asp)

CITY OF PORTLAND, GREEN STREETS CONSTRUCTION GUIDE  
<http://www.portlandoregon.gov/bes/45379?>

CITY OF PHILADELPHIA'S GREEN CITY CLEAN WATERS,  
GREEN STREETS DESIGN MANUAL  
[http://www.phillywatersheds.org/what\\_were\\_doing/gsdm](http://www.phillywatersheds.org/what_were_doing/gsdm)

U.S. ENVIRONMENTAL PROTECTION AGENCY, EFFECTIVE GUIDE TO GREEN STREETS  
[http://water.epa.gov/aboutow/eparecovery/upload/2009\\_09\\_10\\_eparecovery\\_EPA\\_ARRA\\_Green\\_Streets\\_FINAL.pdf](http://water.epa.gov/aboutow/eparecovery/upload/2009_09_10_eparecovery_EPA_ARRA_Green_Streets_FINAL.pdf)

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# Porous Asphalt

## WHAT IT IS

With roads and parking lots accounting for a high percentage of impervious surface, porous asphalt can be an ideal Best Management Practice in the right location. It essentially eliminates the impervious surface that would otherwise be created. Porous asphalt uses a standard asphalt mix with no sand or fines and a polymer binder to provide strength and stability. The void spaces of this mixture allows rain and snowmelt to pass through to a subbase of stone aggregate that both supports the asphalt layer and provides storage for and treatment of rainfall or snowmelt.

Unlike many other stormwater management facilities, porous asphalt requires no additional land or space, functioning within the footprint of the roadway, parking lot, alley, or sidewalk. By promoting infiltration, filtration, and recharge of groundwater, porous asphalt significantly reduces runoff volume and peak flows, decreases runoff temperature, and improves water quality. The University of New Hampshire Stormwater Center (UNHSC) reports that it also speeds snow and ice melt, reducing the salt required for winter maintenance. While porous asphalt is most recommended for low volume and low speed applications, U.S. Environmental Protection Agency has noted that porous asphalt has performed well in all highway pilot projects in the United States. Maine DOT has recently used porous asphalt on a high volume road in South Portland (see more information about this project under Examples).

## WATER QUALITY TREATMENT

The porous asphalt design tested at UNHSC, being widely promoted now in New England, uses coarse sand as a subbase filter course that enhances effectiveness in pollutant removal rates. The facility at UNHSC has demonstrated the following:

Pollutant	% Removal
Total Suspended Solids (TSS)	99
Total Petroleum Hydrocarbons in the Diesel Range	99
Dissolved Inorganic Nitrogen (NO <sub>3</sub> )	No treatment
Total Zinc	75
Total Phosphorous	60
Average Annual Peak Flow Reduction	82

Source: University of New Hampshire Stormwater Center 2009 Annual Report



## DESIGN CONSIDERATIONS

Stormwater design parameters – Three to five feet of vertical separation is needed from seasonal high groundwater. U.S. EPA also notes, “The load bearing and infiltration capacities of the subgrade soil, the infiltration capacity of the porous asphalt, and the storage capacity of the stone base/subbase are the key stormwater design parameters. To compensate for the lower structural support capacity of clay soils, additional subbase depth is often required. The increased depth also provides additional storage volume.”

**Quality control** – Careful assessment of site conditions, and quality control for material production and installation methods are essential to success.

**Protect porous surface from sediment and fines** – To minimize clogging and promote continued good infiltration rates over time it is critical to protect the surface and base from sediment and fines during and after construction. Pretreatment BMPs, such as filter strips and swales, may be important considerations where water is flowing from upland areas onto the surface. Devices such as chatter strips at parking lot entries can also help reduce clogging. Sanding during the winter months should be discouraged.

**Specifications** - For guidance on design, see specification provided by UNHSC at: <http://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/UNHSC%20PA%20Spec%20update-%20FEB-2014.pdf>.

The specification shown in Figure 1 (at right) is intended for:

1. porous asphalt pavement in parking lot applications;
2. a cold climate application based upon the field experience at the UNHSC porous asphalt parking lot located in Durham, New Hampshire. They note that the can be adapted to projects in other climates provided that selection of materials and system design reflects local conditions, constraints, and objectives.

The mix for porous asphalt requires a polymer binder, which may be difficult to acquire for small scale projects. For

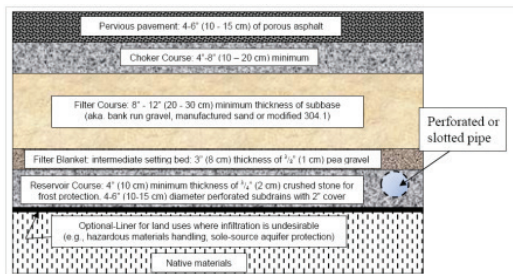


Figure 1: Typical Parking Area Cross Section for Porous Asphalt  
 Courtesy: University of New Hampshire Stormwater Center



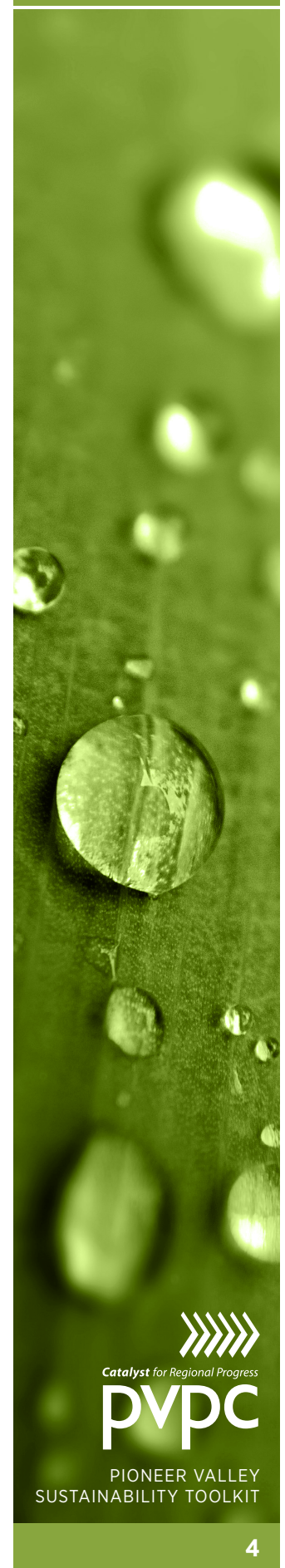
example, when New England Environmental, Inc. in Amherst, MA constructed its porous asphalt parking lot in 2009 it found that the binder specified by UNH for the asphalt mix is only appropriate for larger-scale jobs, because it is only sold by the trailer truckload. New England Environmental, Inc. found a substitute binder that includes polymer fibers, much like what is used for asphalt curbing, that could be acquired by the barrel.

## PERMITTING CONSIDERATIONS

The Massachusetts Stormwater Handbook currently does not allow for porous asphalt in Zone IIs, or near any other critical areas, including Outstanding Resource Waters and Special Resource Waters (see Stormwater Management Standard #6). While the stormwater management standards relate to jurisdictional areas under the Wetlands Protection Act, these standards have been applied by reference through local bylaws and ordinances to upland locations as well. MassDEP is currently proposing a revision to its guidance about porous asphalt, and porous pavements generally, as new information has become available on its treatment capabilities. Until this recommendation from MassDEP is accepted, however, any legal actions will be based on the current guidance within the Stormwater Handbook.

# BARRIERS TO USE

Concern	Experience
Cost	<p>\$10 to \$12 per square foot based on costs for MassDOT Park and Ride facility in Whately, MA, including 16 inches of stone for subbase and 5 inches of surface mix. Note that the scale and size of a project can also affect price, with lower per square foot costs on larger projects.</p> <p>The UNH Stormwater Center notes that material costs alone are about 20 to 25 percent more than traditional asphalt, but total project cost for porous asphalt is comparable to those for conventional asphalt projects if one accounts for the stormwater infrastructure costs that are required to manage runoff from conventional asphalt. The University of Rhode Island in building their porous asphalt parking lots in 2002 and 2003 found that the construction costs were comparable to equivalent sized conventional parking lots.</p> <p>While initial costs of a porous asphalt facility may be slightly higher than a facility that uses conventional asphalt, the lifespan of a porous asphalt parking lot can be more than 30 years compared to 15 years for a conventional parking lot. (See: "Pervious Pavements: New findings about their Functionality and Performance in Cold Climates" by J. Gunderson, Stormwater, September 2008.)</p>
Winter performance	<p>Given the well draining stone bed and structural support of porous asphalt, the freeze thaw cycle tends to produce fewer cracks and potholes than on conventional asphalt pavement. (University of New Hampshire Stormwater Center)</p> <p>"Because of the well-drained nature of the porous pavement and reservoir base, issues related to frozen media were minimized. Significant frost penetration was observed up to depths of 71 cm without declines in hydrologic performance or observable frost heave." (Results of a study published in Journal of Environmental Engineering in January 2012 notes)</p> <p>Low to no black ice development, allowing for reduced salt application rates of up to 50 to 75 percent. Best not to use sand at all to avoid clogging of pours. (University of New Hampshire Stormwater Center)</p>
Maintenance	<p>Requires vacuuming twice each year (spring and fall), and perhaps more frequently depending on use, to prevent clogging of pores with sediment and fines. Several contractors in the region offer vacuuming services. Typically, per square foot costs will be lower with larger jobs. A municipality for example may see better value in hiring to have several lots vacuumed at once rather than each vacuumed on separate occasions.</p> <p>Repairs can be made with standard asphalt, not to exceed 10 percent of surface area. (University of New Hampshire Stormwater Center)</p> <p>For winter maintenance tips, see UNHSC recommendations related to plowing and use of salt for general maintenance, during a storm event, and between storm events. See: <a href="http://unh.edu/unhsc/sites/unh.edu.unhsc/files/docs/UNHSC%20porous%20winter%20maintenance%20fact%20sheet_1_11.pdf">http://unh.edu/unhsc/sites/unh.edu.unhsc/files/docs/UNHSC%20porous%20winter%20maintenance%20fact%20sheet_1_11.pdf</a></p>
Clogging	<p>Studies of the long-term surface permeability of porous asphalt and other permeable pavements have found high infiltration rates initially, followed by a decrease that then levels off with time. With initial infiltration rates of hundreds of inches per hour, the long-term infiltration capacity remains high even with clogging. See: <a href="http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&amp;Rbutton=detail&amp;bmp=135&amp;minmeasure=5">http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&amp;Rbutton=detail&amp;bmp=135&amp;minmeasure=5</a></p>
Durability	<p>The University of New Hampshire Stormwater Center acknowledges that while porous asphalt is weaker than conventional asphalt pavements, durability can be greatly improved with the proper admixtures and design. It has been effective for both commercial and roadway applications. (UNHSC 2012 Annual Report)</p>



## EXAMPLES OF WHERE STRATEGY HAS BEEN IMPLEMENTED

### New England Environmental, Inc. headquarters, Amherst, MA

As part of developing their new LEED platinum rated office building, New England Environmental, Inc. included porous asphalt in a suite of stormwater management strategies that also includes rain gardens and grass pavers. They used porous asphalt for all travel lanes (about a 10,000 square foot area), while grass pavers were used in all parking stalls. The porous asphalt has been in place since 2008 and is performing beyond expectations with vacuuming occurring twice each year to remove sediment and fines. Owner Mickey Marcus reports that the cost for the parking lot as a whole was equivalent to the cost of a conventional parking lot with attendant stormwater management facilities. For the future, Marcus discourages the use of grass pavers in combination with porous asphalt as the pavers become too easily damaged with winter plowing. See figure 2.



Figure 2: New England Environmental, Inc. with porous asphalt drive in foreground and grass paver parking stalls in middle ground | Courtesy: Mickey Marcus, NEE

### MassDOT Park and Ride facility, Routes 5 and 10, Whately, MA

At the request of the local conservation commission, which was concerned about the parking facility's proximity to a wetlands area, MassDOT used porous asphalt in the 40 parking stalls at this new Park and Ride facility in Whately, MA. The porous area has 16 inches of stone in the subgrade and 5 inches of surface mix. Construction costs ran \$10 to \$12 per square foot for the porous asphalt area. MassDOT used traditional asphalt in the travel lanes for this facility.

### Maine Mall Road, South Portland, ME

Maine DOT used porous asphalt on this four lane (75-foot wide) high-volume road (16,750 AADT) as part of a larger effort to restore a local creek to its water quality classification. They installed porous asphalt on 850 linear feet and used a specification that included a 3-inch open graded friction course, followed by 6 inches of asphalt treated permeable base, 15 inches of stone reservoir, and 6 to 12 inches of porous filter material (see project location in Figure 3 and cross section in Figure 3 below.) Total project costs were \$90 per square yard and the project was funded entirely through the American Recovery and Reinvestment Act monies.<sup>1</sup>

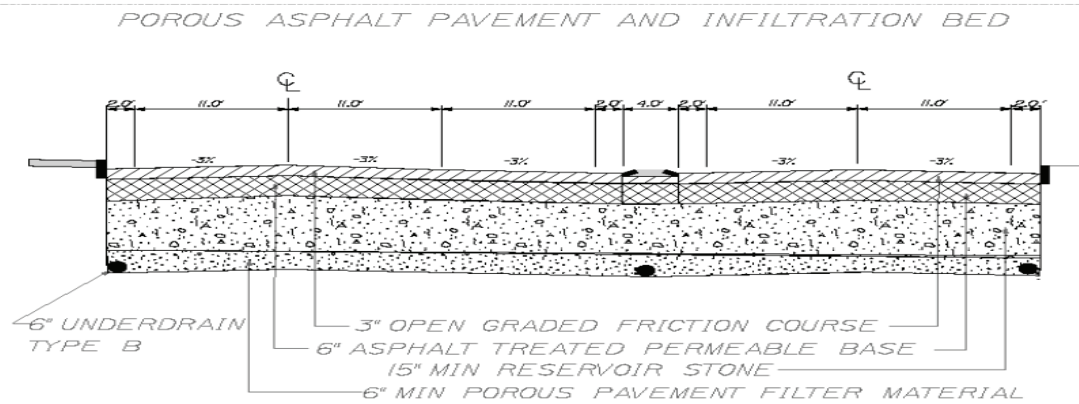


Figure 4: Cross section of porous asphalt system on Maine Mall Road | Source: Maine DOT

## University of Rhode Island, Kingston, RI

In 2002 and 2003, the University of Rhode Island built two porous asphalt parking lots over a sole source aquifer. One lot is 5.5 acres and accommodates 800 vehicles while a smaller 1.47 acre lot accommodates 200 vehicles. Due to concerns of potential groundwater contamination and compaction of the asphalt, commercial and industrial vehicles are not permitted to park on these lots. In addition the recharge bed was designed to be 6 to 6.5 feet above seasonal high groundwater. Design of the facility includes a 2.5 thick porous asphalt surface layer, a 1-inch layer of choker course, and 3 to 3.5 feet of crushed rock to temporarily store and infiltrate rainfall and snowmelt. The crushed rock storage reservoir is separated from underlying soils and adjacent subsurface materials by a layer of geotextile filter fabric. Intended to prevent movement of fine soil particles up into the overlying reservoir, the fabric instead captured fines moving down from the overlying layers and became clogged so that water cannot infiltrate and moves laterally across the barrier.

Entrance areas of the parking lots are paved with conventional asphalt to accommodate heavier use and to better receive sediment deposition from tires as vehicles enter the lot. Landscaped parking lot islands act as bioinfiltration areas throughout the parking areas to provide a secondary route of infiltration during intense rainfall and in case the pavement surface gets clogged up. The outer areas of the lot are landscaped with trees and grass to keep windblown dust from nearby agricultural activities from accumulating on the porous asphalt.

During the summer of 2005, a new porous asphalt parking area was constructed expanding the existing lot and increasing the capacity from 814 to 1582 spaces. The new lot covers 5.8 acres. Several changes were made to the new lot to allow for simpler maintenance. They are:

1. Fewer, wider infiltration islands
2. Curb cuts for water entry to island bioinfiltration areas
3. Mowed grass, not meadow grass for islands
4. Fewer wheel stops, where possible, due to wheel stops being moved by cars and plowing

## LINKS TO MORE INFORMATION

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# Rain Water Harvesting

## PURPOSE

Rainwater harvesting is a means to capture runoff from rooftops and store it for non-potable uses such as irrigation and greywater plumbing. In addition to reducing the demand on public water supplies by replacing potable water with rainwater, rainwater harvesting can reduce peak stormwater flows, potentially reducing combined sewer overflows and other pollution associated with stormwater runoff.

Rainwater harvesting – collecting rainwater from impervious surfaces and storing it for later use – is gaining in popularity as communities, businesses, and homeowners seek ways to affordably manage stormwater, and address the potential for increasingly limited water resources caused by climate change. The many benefits of rainwater harvesting and reuse include:

- » Provides inexpensive supply of water for outdoor water use and non-potable indoor uses
- » Reduces stormwater runoff and associated pollution by reducing peak flows
- » Helps reduce peak summer water use demand by creating alternative water supplies

## RAINWATER HARVESTING SYSTEMS

Rainwater harvesting systems typically divert and store runoff from residential and commercial roofs. Often referred to as ‘clean’ runoff, roof runoff does contain pollutants (metals or hydrocarbons from roofing materials, nutrients from atmospheric deposition, bacteria from bird droppings), but they are generally in lower concentrations and absent from many of the pollutants present in runoff from other impervious surfaces. Installing a rainwater collection system requires diverting roof downspouts to cisterns or rain barrels to capture and store the runoff. Collection containers are constructed of dark materials or buried to prevent light penetration and the growth of algae.

From the storage container, a dual plumbing system is needed for indoor uses and/or connection to an outdoor irrigation system.

## DESIGN CONSIDERATIONS

Every rainwater harvesting system, from a single 60-gallon rain barrel to a 1,400-gallon underground cistern, is custom tailored to site features, intended water use, budget, whether it is new construction or a retrofit, and how much space is available for storage capacity. Points toward LEED project certification are also available for a properly designed rainwater harvesting system.

Some general design considerations for every project include:

- » The earlier rainwater harvesting is incorporated into a new building design process, the more efficient and cost effective-it will be.
- » The largest and often most expensive system feature will be the storage tank, also called a cistern.
- » Storage tanks can be installed above or below ground.
- » Storage located high on the building or the site saves energy and costs (no pumps = zero energy use).
- » Elevated storage requires structural and seismic engineering.
- » Above ground storage structures can serve additional beneficial purposes as shade or privacy structures, and as heat sinks.
- » If space permits, size the cistern to capture the occasional really large storm, and have water available for extended dry periods.
- » Cisterns designed for full time domestic water use should be sized based upon a minimum of 30 gallons per day per person. <http://www.saveourh2o.org/water-use-calculator>
- » Underground storage tanks must be anchored to keep from floating when empty.
- » Use gravity as much as possible for the movement of water in the system.
- » Plumbing, backflow, overflow, and air gaps are important design features, and may require a licensed plumber depending on local code requirements.
- » Above ground tanks must be drained completely before freezing temperatures, and thus are seasonal applications.
- » Maintenance depends on intended reuse of water. Typical maintenance includes keeping gutters and cistern screens clean as well as periodic inspection and replacement of any water treatment components and equipment, including pumps and backflow prevention devices. The tank will require cleaning annually for potable water sources.
- » Rain barrel costs, including installation, range from \$60-\$150.
- » Underground storage systems range in cost depending on the size of the cistern and the water reuse application. For example, a buried 1,800 gallon storage tank with overflow directed to a drywell recharge area, including submersible pump for supply to an irrigation system, costs \$5,000-\$6,000, including installation.



## How to Size a Rain Barrel

Rain barrel volume can be determined by calculating the roof top water yield for any given rainfall, using the following general equation:

$$V = A2 \times R \times 0.90 \times 7.5 \text{ gals./ft.}^3$$

V = volume of rain barrel (gallons)

A2 = surface area of roof (square feet)

R = rainfall (feet)

0.90 = losses to system (no units)

7.5 = conversion factor (gallons per cubic foot)

Example: One 60-gallon barrel would provide runoff storage from a rooftop area of approximately 215 square feet for 0.5 inch (0.042 ft.) of rainfall.

## REGULATIONS

Massachusetts has no statutes or regulations concerning rainwater harvesting. Consequently, greywater requirements are often used to govern rainwater harvesting systems, resulting in requirements that are more stringent than necessary for outdoor water use. In 2010, the International Association of Plumbing and Mechanical Officials (IAPMO) published the first of its kind Green Plumbing and Mechanical Code Supplement (GPMCS). The supplement is a separate document from the Uniform Plumbing and Mechanical Codes and establishes requirements for green building and water efficiency applicable to plumbing and mechanical systems. In addressing “Non-potable Rainwater Catchment Systems”, the GPMCS specifically identifies provisions for collection surfaces, storage structures, drainage, pipe labeling, use of potable water as a back-up supply (provided by air-gap only), and a wide array of other design and construction criteria. It also refers to and incorporates information from the ARCSA/ASPE Rainwater Catchment Design and Installation Standard, a document published in 2008 under a joint effort by the American Rainwater Catchment Systems Association (ARCSA) and the American Association of Plumbing Engineers (ASPE). (EPA, 2013)

## CROSS-CONNECTIONS WITH MUNICIPAL WATER SUPPLY AS BACKUP SOURCE

State code allows the direct plumbing of municipal water supply to a RWH system as a back-up water supply provided an approved reduced pressure backflow preventer (RPBP) is installed and included under a required maintenance plan. These fixtures have a physical air gap internal to the device that separates “unregulated” harvested water from the municipal supply. A standards model of an RPBP is approved by MA DEP for use in cross-connections.



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## WATER RATES

Water rates are perceived as irresponsibly low by many water sustainability professionals and researchers, and seldom reflect the true costs of its use. Many communities also have a decreasing block rate structure wherein water becomes cheaper on a unit basis the more one uses. Low rates are perhaps the largest impediment to rainwater harvesting systems, since under current rate structures one would never build a harvesting system to save money on water usage, except in a rare case where a site is particularly water constrained.

## TREATMENT REQUIREMENTS

Since no standards exist for secondary exposure to contaminants or bacteria from use of harvesting systems (e.g spray irrigation, toilet use, etc.), municipalities often use primary exposure thresholds (e.g drinking the water) to set water quality requirements for harvesting systems since no scientific basis for assessing risk exposure exists today. Or, greywater reuse code provisions are applied which are not necessarily appropriate and are typically considered over treatment which results in increased costs to a project limiting implementation of these systems.

## CONSIDERATIONS FOR ESTABLISHING A MUNICIPAL RAINWATER HARVESTING PROGRAM

- » **Establish specific codes or regulations for rainwater harvesting** – Local codes should define rainwater harvesting and establish its position as an acceptable stormwater management and water conservation practice.
- » **Identify acceptable end uses and treatment standards** – Consider and identify acceptable uses for harvested rainwater and the required treatment for specific uses. Rainwater is most commonly used for non-potable uses and segregated by indoor and outdoor use.
- » **Detail required system components** – Delineate between rain barrels and cisterns. Needed system requirements include: pre-filtration (screens, etc.), storage containers, back-flow prevention, dual piping system, cross-connection prevention, and signage for locations of potable and non-potable water within the system. Refer to the UPC's Green Plumbing and Building Code Supplement for guidance.
- » **Permitting** – Rain barrels should not require local permitting. A building permit may be required for cistern systems used for non-potable water uses. If harvested rainwater is used for potable water, the collection and treatment system should be inspected and approved by the local Board of Health.
- » **Maintenance** – Adequate design and maintenance of the cistern and piping system is the responsibility of the cistern owner.

- » **Rates of use** – To be used efficiently for maximum stormwater retention, rainwater needs to be used in a timely manner to ensure adequate storage capacity for subsequent rain events. Municipalities should engage in outreach and education about best practices. Harvesting programs targeting combined sewer areas should promote post-storm slow draw down of rain barrels and cisterns to delay stormwater release to the sewer system and ensure maximum storage for the next storm.



## LOCAL RAINWATER HARVESTING PROJECTS

### Center-Pepin School, Easthampton, MA

A 305-gallon storage tank collects rainwater from a 670 square foot roof and serves as a source of irrigation water for the school yard garden. The cistern does not fully capture the first one inch storm, and overflow is directed to an existing ground level concrete channel along the building which drains to the municipal storm sewer. The system cost \$308 plus \$125 for delivery, and was installed by volunteers at the school.

### MassMutual Financial Group, Springfield, MA

Roof water reclamation serves as a reservoir for on-site irrigation. 60-inch diameter HDPE piping provides 200,000 gallons of storage. An independent pumping system pressures water for irrigation system. There is automated conversion to domestic water during dry periods, and a smaller infiltration system for winter.



A similar system to the one in the photo was installed at MassMutual.

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# Tree Box Filters

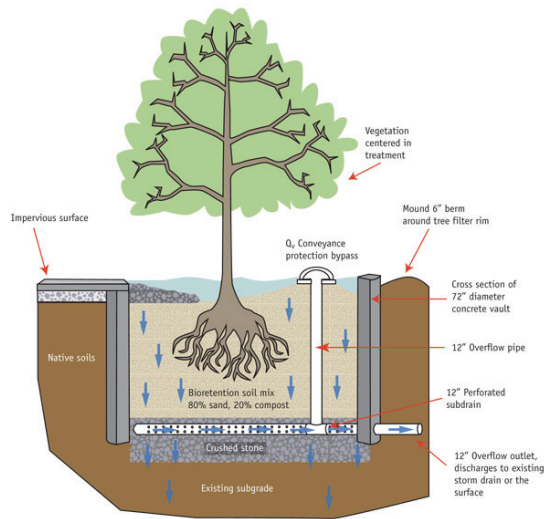
## WHAT IT IS

Tree box filters are typically installed along roadways to act as mini bioretention systems. They are particularly useful in urban settings where space is limited and where traditional street tree plantings can be converted to provide stormwater management functions. A tree box filter involves a prefabricated concrete box that can be bottomless to promote infiltration or closed bottomed where soils are not conducive to infiltration. The box typically contains a metal grate at the surface to protect the integrity of the tree's roots and soils, a soils mix designed to both promote tree growth and stormwater function, a tree species (tolerant of road salt and the varying cycles of inundation and drought), and a perforated subdrain located within a bed of crushed stone at the very bottom.

Storm runoff from adjacent roadways and sidewalks enters the box through an inlet along the curbing and then soaks into and gets filtered by the soil mix. Stormwater is then taken up by tree roots, or soaks deeper into the subgrade to recharge groundwater, or collects in a perforated subdrain to discharge to the storm sewer system or to the surface.

## WATER QUALITY TREATMENT

Like other bioretention systems, the tree filter box retains, degrades, and absorbs pollutants as stormwater filters through layers of mulch, soil, and plant roots. The University of New Hampshire Stormwater Center (UNHSC) installed its first tree box filter



Source: University of New Hampshire Stormwater | Center, 2009 Biannual Report

Tree box filter boxes are prefabricated bioretention cells that can be integrated into existing curb and catch basins drainage systems along streets to receive runoff from adjacent impervious surfaces.

in 2004 and reports, “Their water quality treatment performance is high, often equivalent to other bioretention systems, particularly when well distributed through a site.” UNHSC’s 4-foot deep, 6-foot diameter facility demonstrated the following:

Pollutant	% Removal
Total Suspended Solids (TSS)	93
Total Petroleum Hydrocarbons in the Diesel Range	99
Dissolved Inorganic Nitrogen (NO <sub>3</sub> )	3
Total Zinc	78
Total Phosphorous	NT
Average Annual Peak Flow Reduction	NT

Source: University of New Hampshire Stormwater Center 2009 Biannual Report

During a two-year study at the University of Virginia using a manufactured tree box filter called Filterra made by Americast, Inc. researchers found “...pollutant removal rates vary as a function of the filter surface area to drainage area.” At the minimum of .33% filter surface area to drainage area ratio filtering 90% of the annual runoff (calculations that involved the rainfall distribution and frequency data from the mid Atlantic region) the expected pollutant removal rates are as shown below. They note that higher pollutant removal rates are made possible by increasing the ratio of filter surface area to drainage area.

Total suspended solids: 85%

Total phosphorous: 74%

Total nitrogen: 68%

Metals: 82%

### Peak Flow Reduction

UNHSC notes in its 2009 Biannual Report that, “Without additional engineering, the tree box filters can do little to reduce peak flows unless sited in appropriate soils, such as those in groups “A” (sand, loamy sand, or sandy loam with high infiltration rates) and “B” (silt loams or loams with moderate infiltration rates).”

A technical bulletin from the Virginia Stormwater Manual notes that while tree box filters are not used generally for the attenuation of runoff for stream channel erosion control and flood control purposes, “...some degree of volume/flow reduction can be achieved

by combining this filter system with an adjacent [downstream] underground storage / detention system (gravel trench or pipes). Such a combined system may be useful for urban retrofit projects to address problems associated with combined sewer overflows or for stream protection.”

## DESIGN CONSIDERATIONS

There are numerous prefabricated tree box filter structures that are commercially available. They are generally sized and spaced much like catch basin inlets. Design variations are abundant and as mentioned above, the functionality of the tree box filter can be augmented for volumetric control with adjacent underground storage or given naturally well draining soils (Groups A and B). Design (sizing, spacing, installation, and location) are done in accordance with manufacturer’s specifications.

While drainage areas may range in size from one-quarter to a half acre, there is an optimum ratio between filter surface area to drainage area that brings together cost effectiveness



Source: Neponset River Watershed Association

The Neponset River Watershed Association worked with the Town of Milton to retrofit an existing “curb and catch basin” drainage system in the Central Crossing neighborhood with tree filter boxes. The project reduced bacterial loading to Pine Tree Brook and the Neponset River while raising awareness of these facilities as a cost effective approach to stormwater management.

with pollutant removal effectiveness. The two-year study at the University of Virginia, which used the tree box filter manufactured by Filterra and rainfall distribution / frequency for the Mid Atlantic region, found that the optimum ratio between filter surface area to contributing impervious surface drainage area is 0.33% (36 ft<sup>2</sup>) of filter surface for every ¼ acre of drainage area. This would require a 6 by 6-foot filter box.



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For locating tree box filters, the State of Virginia Stormwater Management Program offers the following guidelines. Tree box filters are,

...best incorporated into the overall site, or streetscape or parking lot landscaping plan. The individual box locations represent a combination of drainage considerations (based on final grades and water quality requirements), desired aesthetics, and minimum landscaping requirements, and must be coordinated with the design of the drainage infrastructure.

Because proper functioning of the soil media is so critical (as with other bioretention facilities), there are several additional consideration worth noting:

- » **Tree box filters are installed after site work is complete and stabilization measures have been implemented. It is important to protect the filter media from premature clogging and failure.**
- » **Exposing the soil, microbes, and plants to prolonged and frequent flooding and wet conditions will significantly change the hydrologic regime reducing the effectiveness of the media to capture pollutant and the microbe's/plant's abilities to cycle nutrients, break down organics and uptake heavy metals. If the filter media remains water logged for 3 or 4 days anaerobic conditions will develop, dropping both oxygen and pH levels which may kill desirable soil microbes and plants. As such, runoff should not be detained and stored in a holding tank to be metered out to the filter media over a long period of time and frequent flows (such as from basement sump pumps) must be excluded.**



# BARRIERS TO USE

Following are possible concerns that may serve as barriers to use of tree box filters.

Concern	Experience
Cost	<p>There are a variety of costs described in the available literature on tree box filters, ranging from \$1,500 to \$10,000. Recent quotes from manufacturers of these systems provide perhaps a more realistic range: \$7,000 to \$12,000, depending on size and not including installation. For public projects, installations can be done by municipal public works department or they might be bid out as part of a larger construction project.</p> <p>Annual maintenance cost for an owner has been reported at approximately \$100 per unit. Annual maintenance by the manufacturer is \$500 per unit.</p>
Winter performance	<p>University of New Hampshire Stormwater Center found, "The tree box filter's ability to treat water quality remained relatively stable in all seasons... While some seasonal variation in infiltration capacity and nitrogen removal does occur, cold conditions do not seem to warrant significant design alterations."</p>
Maintenance	<p>Once the tree is established, annual maintenance is typically minimal. In UNHSC's five-year experience with the tree filter box (installed in 2004), they note that maintenance entailed only routine trash removal and periodic inspections to ensure that the bypass and soils are adequately conveying water. In 2008, they also removed the top two inches of surface fines accumulation to restore infiltration capacity (due to an accumulation of sealcoat fines and flakes which caused a noticeable reduction in infiltration). Periodic removal of surface fines (similar to that of deep sump catch basins) may be useful over the long term to support infiltration.</p> <p>Manufacturers may provide services for inspection, care, and maintenance of the tree box filter for the first year or two after installation.</p> <p>Charles River Watershed Association notes that maintenance entails the following:  periodic inspection of plants and structural components, periodic cleaning of inflow and outflow mechanisms (the system comes with an observation well that can be used as a clean out), periodic testing of mulch and soil for buildup of pollutants that may be harmful to the vegetation. Biannual replacement of mulch.</p>

## LINKS TO MORE INFORMATION

UNIVERSITY OF NEW HAMPSHIRE STORMWATER CENTER. MARCH 2010.  
“UNIVERSITY OF NEW HAMPSHIRE STORMWATER CENTER 2009 BIENNIAL  
REPORT.” SEE:  
<http://www.unh.edu/unhsc/>

CHARLES RIVER WATERSHED ASSOCIATION. APRIL 2008. “EVALUATION OF GREEN  
STREET DESIGN ELEMENTS AND BEST MANAGEMENT PRACTICES: COMPARISON OF  
CONVENTIONAL AND STORMWATER TREE PITS.” SEE:  
[http://www.crwa.org/hs-fs/hub/311892/file-642201447-pdf/Our\\_Work\\_/Blue\\_Cities\\_Initiative/Resources/  
CRWA\\_Stormwater\\_Trees\\_Urban\\_Environment.pdf](http://www.crwa.org/hs-fs/hub/311892/file-642201447-pdf/Our_Work_/Blue_Cities_Initiative/Resources/CRWA_Stormwater_Trees_Urban_Environment.pdf)

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# Code Review Checklist

## PURPOSE

The Code Review Checklist is a tool for assessing the capacity of local regulations to support green infrastructure options in new development and redevelopment within a community.

There are many reasons why a community should support the development of green infrastructure in both new development and redevelopment. In addition to the effectiveness of the many structural practices designed to manage and treat storm water close to its source through natural or engineered systems, green infrastructure facilities can be beautiful, compatible with the pedestrian environment, and support place making design elements at almost any site. The pending reissuance of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit will also require regulated communities to assess their local regulations and policies for compatibility with green infrastructure practices.

## HOW IT WORKS

The Code Review Checklist is divided into several easy to follow sections that allow a community to determine:

- » if their local regulations are compliant with the draft 2010 NPDES MS4 Permit;
- » the degree to which their street design, parking lot and other local requirements affect the creation of impervious cover;
- » and the extent to which a Low Impact Design (LID) approach is integral to site planning and development.

The checklist does not offer a ranking or final score but rather identifies specific areas of local regulations that can be improved upon to better support green infrastructure and LID site planning.

**NPDES MS4 Permit Compliance** – Based on the draft 2010 permit, the Code Review Checklist asks a series of questions that allow the municipality to determine if their local bylaws or ordinances meet permit requirements for stormwater management program funding, illicit connections, erosion and sediment control at construction sites, and post construction stormwater management in new development and redevelopment.

**Street and Parking Lot Standards in Subdivision Regulations and Zoning** – Once completed, these sections of the Code Review Checklist offer a comparison between existing code requirements and LID standards for road width and length, rights of ways, sidewalks, cul de sacs, stormwater management facilities, and landscaping requirements.

**Feasibility of Green Infrastructure in Other Local Regulations, Policies, and Programs**

This section of the Checklist seeks information about other zoning tools such as open space or cluster development, Board of Health and wetland regulations, street tree policies and programs, and local building/plumbing codes relative to programs such as rain water harvesting.

## RESOURCES

The Pioneer Valley Green Infrastructure Code Review Checklist is a compilation of guidance drawn from several resources including The Center for Watershed Protection's Code and Ordinance Worksheet, the U.S. Environmental Protection Agency's Water Quality Scorecard, and the Metropolitan Area Planning Council's Low Impact Development Toolkit Checklist for Regulatory Review.

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# Green Infrastructure In Zoning

## PURPOSE

**Measurable standards can be adopted within municipal zoning codes, and subdivision and stormwater regulations, to promote a comprehensive approach to Low Impact Development and the integration of green infrastructure in community development.**

There are many opportunities within local zoning codes and subdivision and stormwater regulations to promote Low Impact Development (LID) standards and green infrastructure including the use of incentives, code requirements with standards, and a well-defined planning process that promotes coordination between preliminary plans, site plans, and stormwater management plans. Examples include incentives such as density bonuses, infiltration requirements with design standards, and planning for multipurpose functionality of design elements such as buffers and screening for landscaping and stormwater management. Rather than adopting a separate bylaw that may conflict with other sections of the zoning code, integrate green infrastructure throughout such that it becomes the norm not an exception.

Many green infrastructure strategies have multiple benefits and offer a more comprehensive approach for addressing a range of issues and challenges. For example, a green roof takes up no extra space at all, manages storm water by reducing peak flows, improves the heating and cooling efficiency of a building, and has the potential to be a source of food production. Techniques such as bioretention areas, grass filter strips, and swales can also meet landscaping and open space requirements while addressing stormwater treatment and infiltration.



## Green Infrastructure

Communities are exploring strategies that promote capture and control of rain water near where it falls. This includes the use of natural or engineered systems – such as green roofs, rain gardens, or cisterns. In these facilities, stormwater can be cleansed as it moves through soils and plant roots (treatment), returned to groundwater (infiltration), returned to the air (evapotranspiration), and/or captured to irrigate plants or flush toilets (reuse). This approach is called “green infrastructure” because of the use of plants to enhance and/or mimic natural processes. Green infrastructure contrasts with traditional “gray infrastructure” which is typically built to capture and retain large volumes of stormwater collected over a large area, and convey it to the nearest waterway.

Source: Pioneer Valley Green Infrastructure Plan, February, 2014

## AN EFFECTIVE PERMITTING PROCESS IS CRITICAL

Critical to effective implementation of green infrastructure facilities is the site inventory and analysis process which should occur before any design work. Existing site conditions may offer opportunities to minimize impacts as well as the costs of stormwater management and can be identified through careful site analysis. Local zoning and permitting can promote a thoughtful process by defining the planning process, and providing standards for green infrastructure.

### Town of Franklin, Massachusetts – Best Development Practices Guidebook

Franklin, Massachusetts’ commitment to expedited permitting resulted in creation of their Best Development Practices Guidebook to take the guess work out of permitting requirements for developers. Critical to smooth and successful permitting is their four step process for site plan and subdivision applications that begins with an existing site conditions map and an initial pre-development meeting, held every Wednesday at 3 PM, with representatives from all town boards, the police and fire departments, and Town Counsel. Developers are offered guidance on how to meet multiple permit requirements and community planning objectives with the least amount of time and expense. Through this process, LID and green infrastructure strategies are coordinated with other project requirements early in the planning process.

[http://www.town.franklin.ma.us/Pages/FranklinMA\\_planning/initiatives/bestdevelopment.pdf](http://www.town.franklin.ma.us/Pages/FranklinMA_planning/initiatives/bestdevelopment.pdf)

# INTEGRATING GREEN INFRASTRUCTURE STANDARDS

## Drainage

A best practice for eliminating conflicting standards is to reference the local stormwater bylaw or regulation within needed sections of the zoning code for appropriate drainage standards, thereby keeping all drainage standards and specifications in one section of the local code. All zoning standards for drainage should be consistent with the purpose and standards identified in any local stormwater management bylaw, regulation or policy to provide a seamless process for promoting LID site planning. Conserving the natural hydrologic function of a site, reducing impervious surfaces and preventing runoff are key principles in ensuring post development peak flows do not exceed predevelopment peak flows. Green infrastructure facilities should be explicitly encouraged for treatment, attenuation, and infiltration of stormwater at decentralized locations around a site to capture stormwater at its source.

## Dimensional and Density Regulations

Explicitly allow bioretention areas, rain gardens, filter strips, swales, and constructed wetlands within required setback areas.

Allow reduction in frontage (and corresponding road length/paved area) where appropriate, such as in Open Space Residential Developments, at the outside sideline of curved streets, and around cul-de-sacs. Removal of all frontage requirements for open space developments allows greater flexibility for such projects.

Setbacks for front, rear, and side yards should promote a walkable streetscape and support community character which means they will likely vary based on land use. In a mixed use district, setbacks should include enough space to comfortably design a pedestrian sidewalk against the building, a single lane automobile access lane or driveway, and a substantial vegetated buffer adjacent to the residential use as a screening buffer that can also serve as stormwater green infrastructure. A rear setback of 30-50 feet maybe required to ensure that loading, trash removal and other similar activities have adequate room. Flexibility in these standards due to lot configuration is important.

## Site Preparation, Landscaping, Screening and Buffers

Landscaping requirements and objectives vary as a function of land use and activity. Emphasize native vegetation preservation on-site, and note that screening and buffer areas can be used for stormwater management provided that screening functions are not compromised. Consider including design standards for landscaping and screening that encourage the use of green infrastructure facilities. In the same way that architectural design standards serve a town, design standards for landscaping can support place-making within neighborhoods and across a community.



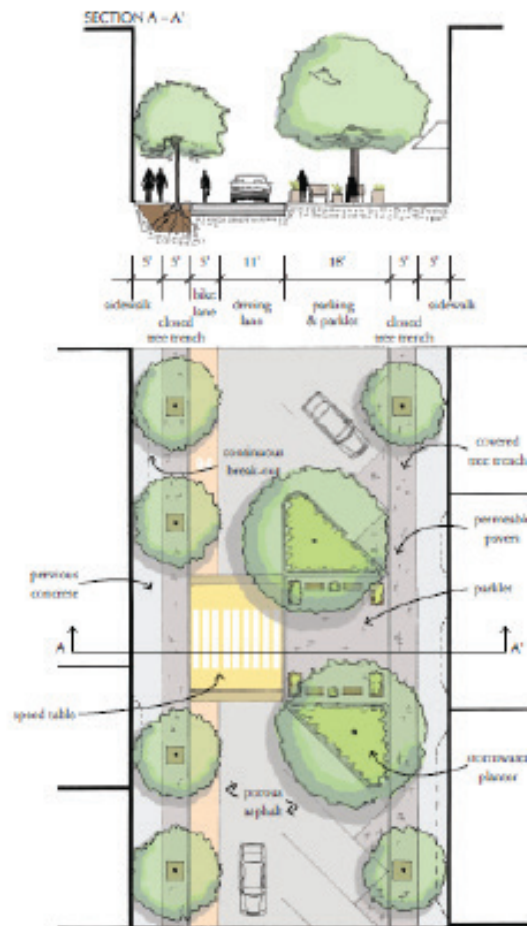
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## Roads

Roadways should be designed to be as narrow as possible while still wide enough to accommodate travel lanes, regular on-street parking (where required), and the passage of emergency vehicles, school buses, and the occasional delivery truck. Many local standards will specify that local urban roads be paved to a width of between 28 and 32 feet, while local rural roads might have a standard of only 22 feet in width. These guidelines are appropriate for high density development or higher vehicle volumes but are generally excessive for most suburban and rural developments. At a minimum, local codes and regulations should not discourage or prohibit impervious cover reductions. Curbs should be eliminated wherever possible to allow road drainage into open channel systems or other green infrastructure facilities. Requirements for curb and gutter infrastructure (i.e. requirements for new subdivisions to connect to storm sewer infrastructure) can be replaced with requirements for "perforated curb and swale" infrastructure, or simply roads without curbs where appropriate.



In thriving commercial areas, shaded pedestrian seating areas and calmed vehicular traffic invite people out in the neighborhood. Covered tree trenches manage stormwater and landscape pedestrian paths between the sidewalk and road, guiding circulation in the commercial district.

SOURCE: Holyoke Green Streets Guidebook, 2014



Landscaping and street standards can work well together to support community development objectives such as an improved pedestrian experience with a downtown commercial shopping district as illustrated in the City of Holyoke’s Green Streets Guidebook (2014) image herein.

### Example Road Travel Widths for Local Streets

Minimum Road	Parking	Average Daily Trips (ADT)	Number of Dwelling Units Served
20	Parking on both sides*	<200	20
22	Parking on one side*	200-400	20-40
26	Parking on both sides	400-2,000	40-200
28	Parking on one side	>2,000	>200
32	Parking on both sides	>2,000	>200

\*Parking is restricted to one side during a snow emergency. No parking is designated of road is a designated fire lane. Source: Rhode Island Low Impact Development Site Planning and Design Guidance Manual. Horsley Witten Group and RI DEP, March 2011.

The standard ROW width of between 50-60 feet can also be excessive in many situations. Wide ROWs require more clearing and grading, potentially changing the ecological function of a site and creating more expense. The ROW need only be wide enough to contain all of the cross sectional elements including sidewalks, utility easements, parking lanes, drainage features, and travel lanes which depend on the size, density and location of the development. More moderate standards for ROW construction may include a 44- to 50-foot ROW width for 26- to 30-foot wide local urban and suburban streets. In a rural setting, a 40-foot ROW for 22-foot wide local roads might be more appropriate.

Also in subdivisions, there are opportunities to reduce the required radius of a cul-de-sac (down to an outer road radius of 30 to 40 feet), and to allow hammerhead turnarounds. On dead end streets, hammerhead turnarounds can provide a feasible way to reduce paved area while providing sufficient turnaround space for larger fire vehicles.

## REDUCING IMPERVIOUS SURFACES IN PARKING REQUIREMENTS

Communities should establish both minimum and maximum parking ratios to provide adequate parking while reducing excess impervious coverage. Parking reductions could be allowed for factors such as: mixed land uses, access to alternative transportation, demographics, and utilization of Transportation Demand Management (TDM) Programs including subsidized mass transit and parking cash out programs. Flexibility is a key component to providing adequate but not excessive parking.

**Off Street On-site Parking Requirements** - Identify maximum parking spaces. Consider requiring a Special Permit for an increase in maximum parking allowance. Some on-site parking requirements could be met off-site particularly in redevelopment sites and compact mixed use centers.

**Shared Parking and Other Opportunities to Reduce Parking Requirements** - Establish formulas for the utilization of shared parking for uses with different peak demand periods (e.g. work day peak demand period 9am-5pm; housing peak demand period 6pm-8am). Provide a model shared parking agreement and facilitate implementation. An alternative to shared parking is increasing the number of zoning districts that have minimal parking requirements.

**Parking and Loading Space Standards** - Allow for smaller stalls for compact cars, up to 30% of total parking spaces. Allow pervious pavement driveways and parking stalls, soils permitting, in all zoning districts. Encourage pervious pavement in overflow parking areas and shoulders. Snow storage should not coincide with these areas as it may include sand which will clog pervious pavement and prevent infiltration. This is especially important if porous pavement is being utilized for stormwater management. Edging and curbing can be eliminated or perforated to allow stormwater flows into infiltration and bioretention areas. For larger parking lots, require separating parking rows with planting strips that may function to manage stormwater and shade the lot reducing the heat island effect. Shade tree requirements in planting strips should also take into consideration stormwater treatment.

**On-Street Parking Demand** - Wider residential streets are often justified by the need to provide on-street parking. However, providing a continuous parking lane on both sides of the street is usually an inefficient and expensive way to satisfy the required parking for residential areas, since most of the required parking per unit can be met in driveways or through shared parking. Consider using one or both of the on-street parking lanes as a traffic lane (i.e. a queuing street), both traffic movement and parking needs could be met with a narrower street.

## SIDEWALKS

Flexible design standards should be adopted that are based on safe pedestrian movement and limiting impervious cover. Constructing five-foot wide sidewalks on both sides of the street is not always appropriate, even in medium to high density developments. A three- or four-foot sidewalk on one side of the street is appropriate for many situations. Where practicable, sidewalks should be graded to drain into front lawns, reducing the total amount of runoff generated by the roadway. Consider permeable surfaces such as permeable asphalt or compacted aggregate where appropriate. Walkways may be removed from the roadway entirely and used to provide access to natural features or connect other destinations such as a playground, park or adjacent development.

The Town of South Hadley, Massachusetts allows subdivision developers to pay a fee in lieu of sidewalks in small developments where a sidewalk network may not serve a purpose. The fee contributes to bicycle and pedestrian projects in other areas of town.



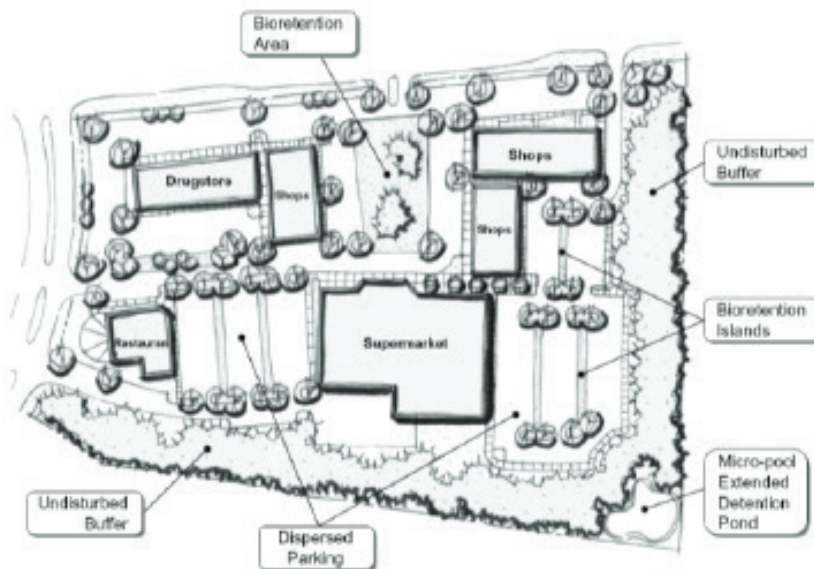
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## OPEN SPACE PROTECTION IN ZONING

Open Space Residential Development (OSRD), Open Space Design (OSD), Conservation Development and Natural Resource Protection Zoning (NRPZ) are the current zoning models for what was previously called cluster or flexible development. This approach utilizes LID site design strategies for conserving natural hydrologic functions and reducing impervious surfaces for preventing runoff, integrating green infrastructure as a fundamental design element. These plans retain native vegetation and natural areas, and structure site layout to greatly reduce street infrastructure. The open space set aside should be based on resource values, not by formula such as X% of the development. The four step planning process reverses the typical subdivision planning process by first, designating open space based on an environmental analysis, siting houses next, layout of roads and trails, and last, lot lines are drawn.



This commercial shopping plaza set aside an undisturbed buffer and integrated green infrastructure facilities to reduce impervious coverage and provide a natural vegetated corridor around the site.  
 Source: Rhode Island Low Impact Development Site Planning and Design Guidance Manual. Horsley Witten Group and RI DEP, March 2011.

## REFERENCES AND RESOURCES

THE CONWAY SCHOOL. CITY OF HOLYOKE GREEN STREETS GUIDEBOOK.  
MARCH, 2014.

Mass Audubon's Shaping the Future of Your Community Outreach and Assistance Program

<http://www.massaudubon.org/our-conservation-work/community-outreach/sustainable-planning-development/shaping-the-future-of-your-community-program/workshops/protecting-land-habitat>

Massachusetts Smart Growth/Smart Energy Toolkit

[http://www.mass.gov/envir/smart\\_growth\\_toolkit/pages/how-to-SG.html](http://www.mass.gov/envir/smart_growth_toolkit/pages/how-to-SG.html)

RHODE ISLAND LOW IMPACT DEVELOPMENT SITE PLANNING AND DESIGN  
GUIDANCE MANUAL. HORSLEY WITTEN GROUP AND RI DEP, MARCH 2011.

[www.dem.ri.gov/programs/bpoladm/suswshed/pdfs/lidplan.pdf](http://www.dem.ri.gov/programs/bpoladm/suswshed/pdfs/lidplan.pdf)

PIONEER VALLEY GREEN INFRASTRUCTURE PLAN, "TABLE 4.3 GREEN  
INFRASTRUCTURE DESIGN RESOURCES". PIONEER VALLEY PLANNING  
COMMISSION, FEBRUARY 2014.

[www.pvpc.org/file/pvpc-green-infrastructure-plan-final-02-18-14pdf](http://www.pvpc.org/file/pvpc-green-infrastructure-plan-final-02-18-14pdf)

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# Subdivision Regulations

## What it is

Subdivision regulations guide the private development of new roads. They control layout and construction, specifying municipal requirements for location, width, and grades of proposed ways. They also specify requirements for public utilities. As streets typically account for 50 to 75 percent of impervious cover in the developed environment, it is critical that these regulations encourage and even require best practices for stormwater management. These regulations should also be consistent with requirements within a municipality's stormwater management bylaw/ordinance.

Cost Savings in a Subdivision Project



Photo: Nashua Telegraph

In Pelham, New Hampshire, a subdivision that took a low impact approach to site development and used green infrastructure stormwater management practices **realized a 6% savings on the total cost of stormwater infrastructure**<sup>1</sup> The road shown here makes use of porous asphalt, allowing rainfall to soak into the surface and filter through underlying soils.

For more on porous asphalt, see related fact sheet.



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Within subdivision regulations, best practices can be addressed in the early stages of the planning process itself, and within requirements for the following:

- » location and length of roadways
- » right of ways
- » paved roadway width
- » curbs
- » drainage
- » sidewalks
- » utilities
- » landscaping
- » cul de sacs

### Planning process

Approval for a subdivision project typically begins with submission of a preliminary plan, which helps initiate a conversation about the project between the developer, planning board, and board of health. This early stage in the project provides communities with an opportunity to promote an integrated site design process and use of distributed stormwater management practices to best match the predevelopment hydrologic condition. This could include advancing provisions within stormwater management regulations and also within zoning regulations for: 1. Open Space Residential Development, which allows for a more compact development pattern to preserve open space and reduce the amount of paved surfaces through clustering of development to the least environmentally sensitive areas; or 2. where appropriate Traditional Neighborhood Development (TND), which involves the more traditional neighborhood pattern used prior to the automobile, and includes small lots and homes with porches oriented toward the street. TNDs typically have narrow roads and on-street parking coupled with reductions in required off-street parking.

For preliminary plan submission, municipalities could provide to developers a standard site analysis checklist to maximize design and functionality of best stormwater management practices. This could include many of the same steps within the conservation development process, beginning with a good site analysis to designate natural drainage areas, important conservation areas, and locating development areas. Applicants could bring the results of this analysis to a pre-application conference. As part of this analysis and reporting, the applicant could identify proposed best stormwater management practices. Soil testing for this site analysis could be for the site overall and not as rigorous as the more detailed soil work necessary to design a stormwater management facility.

It may be useful to include credits for improved stormwater management practices. The Massachusetts Department of Environmental Protection (DEP) stormwater standards as incorporated into the state's Wetlands Protection Act Regulations has established a "LID Site Design Credit" whereby in exchange for directing runoff from roads and driveways to vegetated open areas, preserving open space with a conservation restriction, or

directing rooftop runoff to landscaped or undisturbed areas, developers can reduce or eliminate the traditional BMPs used to treat and infiltrate stormwater.<sup>2</sup>

## Location and length of roadways

Protecting important natural features and minimizing disturbance and amount of paved area is a first line approach to protecting hydrology on a previously undeveloped site. This can be achieved by identifying opportunities to reduce:

- » cut and fill, thereby minimizing disturbance of native soils
- » unnecessary contouring of the site, and
- » removal of native vegetation.

In addition, streets ought to be located in order to protect important natural features, avoiding low areas and steep slopes.

Developers should be encouraged to limit clearing within the right-of-way to the minimum necessary for constructing roadway, drainage, sidewalk, and utilities, and to maintaining site lines. During site development, permeability of soils for infiltration should be preserved. Where soils are compacted by construction vehicles, contractors should be required to reestablish permeability.

Alternative street layouts should be explored for options to increase the number of homes per unit length and minimize the length of the roadway. This might be achieved through clustering of the development or through Traditional Neighborhood Design as described above.

## Right of ways

A right of way is the strip of land that contains all the elements of a roadway. At a minimum, this typically includes vehicle travel lanes, grading and drainage, and utilities. It also can include bike lanes, shoulders, on-street parking, curbs, sidewalks, and vegetated areas. Right of ways between 50 and 60 feet wide are standard, but this it has often led to overdesign with excessive clearing, grading and extensive use of the width for paving.

Good design has not so much to do with the width of the right of way itself, but considerations of context and what makes for efficient and effective use of the right of way. What makes sense for the elements of a right of way on a busy suburban road will likely not make sense for a low volume rural road.

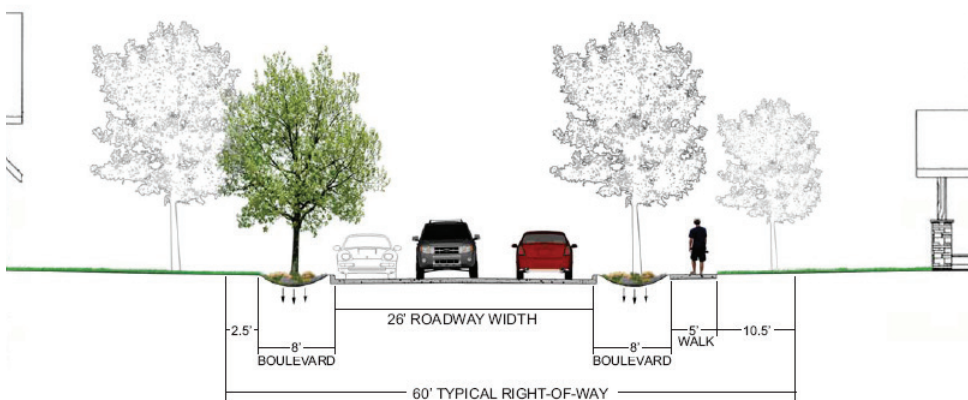
Several communities in Minnesota have developed “Living Streets” policies that take context into consideration. This policy brings together “complete streets” objectives of providing for multiple modes of transportation (vehicular, pedestrian, and bicycle) and “green streets” objectives of reducing environmental impacts (through reduced impervious surface and improved stormwater management). In thinking about how to accommodate these various objectives within the right of way, these communities have developed design options that can be deployed depending on what specific objectives there may be for a project. In Maplewood, Minnesota, there are three design options for

a local street with a 60-foot right of way (note that not all 60 feet in the right of way is used):

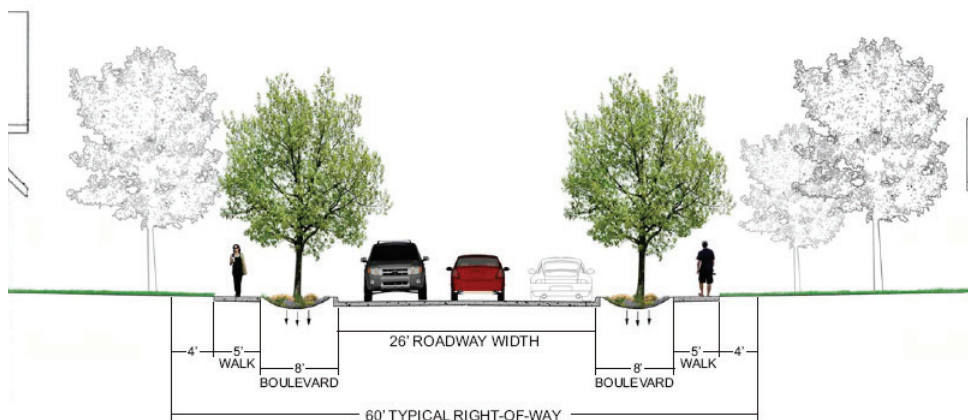
Guidelines from Edina, Minnesota’s Living Street Policy are useful in thinking about right of way use:

- » Provide bicycle accommodation on all primary bike routes.
- » Allocate right-of-way for boulevards (stormwater infiltration facility)
- » Allocate right-of-way for parking only when necessary and not in conflict with Living Streets
- » principles
- » Consider streets as part of our natural ecosystem and incorporate landscaping, trees, rain
- » gardens and other features to improve air and water quality

Municipalities ought to consider the use of drawings that show how the elements of a right of way cross section might vary given different contexts. Such drawings provide a clear understanding about objectives and efficient and effective use of the right of way area.

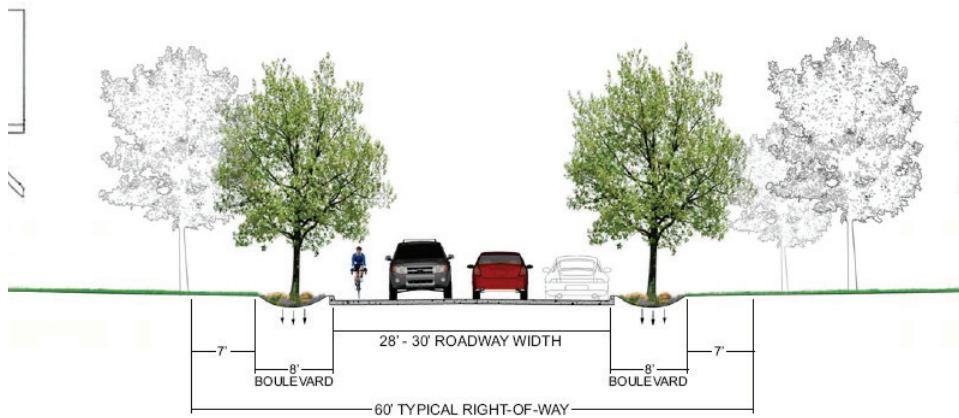


24 to 26-foot roadway width with parking on one side; 8-foot boulevard/ stormwater infiltration facility on each side; and 5-foot sidewalk on only one side



24 to 26-foot roadway width with parking on one side; 8-foot boulevard/ stormwater infiltration facility on each side; and 5-foot sidewalk on each side





28' to 30' roadway width with parking on one side; and 8-foot boulevard/stormwater infiltration facility on each side

Source: City of Maplewood, Minnesota, Living Streets Policy, Adopted January 28, 2013

## Paved roadway width

Narrower road widths produce advantages not only in terms of reduced stormwater impacts, but also lower development costs, improved community character, and enhanced pedestrian safety. As a result, it is important for municipalities to revisit and update roadway width standards within subdivision regulations. Many existing standards are based on universal application of guidelines for highways or very large scale subdivisions planned more than 50 years ago. Revised standards should involve the minimum required pavement width and derive from careful considerations with public works and emergency response officials of traffic volume, on-street parking (where required), and passage of emergency vehicles and school buses. Typical road width reduction standards are shown on the following page.

Communities might also explore the use of permeable shoulders to reduce overall imperviousness of a roadway. This would involve combining a traditional asphalt surface for the travel lanes and an adjacent porous surface for the shoulder or bike lane area. Snow and ice management for the roadway must avoid sand so as to avoid clogging of the porous shoulder area. For more information, see a recent publication entitled, "Permeable Shoulders with Stone Reservoirs," referenced more fully in the Links to More Information Section below.

### Emergency Vehicle Access

Emergency access considerations can have direct bearing on street width. Under the Massachusetts' fire marshal code, the minimum fire access lane width is 18 feet. Generally speaking, this can be met by two 9-foot travel lanes. The purpose of a fire access lane is to allow one fire truck to operate while allowing enough space for a second truck to pass by during the event of an emergency. Fire access lanes can be located on roads, but they must not be obstructed (i.e. by parked cars or snow).

While the state fire marshal code provides a minimum width, fire access lanes cannot be standardized across the state. Each community has different needs and fire apparatus that range in size. Communities may increase minimum fire access lane widths if required for their particular equipment. Alternatively, municipalities may select fire access equipment that allows for narrower lanes consistent with community design goals.

Table 5: General Parameters for Residential Road Design

Parameter	Single Use Residential Wide	Single Use Residential Medium	Single Use Residential Narrow	Single Use Residential Alley
<b>Traveled Way</b>				
Typical ADT	4,999 < 1,500	1,499 < 400	399 < 0	100 < 0
Design speed	25-30 mph	20 mph	20 mph	15 mph
Operating speed	20-25 mph	20 mph	15-20 mph	15-20 mph
Number of Through Lanes	2	2	2	1
Lane Width	10-12 feet	10-12 feet	10 feet	9-10 feet
Shoulder	2 feet	2 feet	2 feet	2 feet
Bike Lanes	Shared road Or 6 feet wide	Shared road	Shared road	Shared road
Utility Easement Width	----	----	10 feet	10 feet
Range of ROW Width	40-50 feet	36-40 feet	33-36 feet	20 feet
<b>Roadside</b>				
Desirable Roadside Width (pedestrian, swale, and planting strip)	5.5-12 feet	5.5-10 feet	5.5 feet	None
Grass Plot/Planting Strip	0-6 feet	0-6 feet	0-6 feet	None
Minimum Sidewalk Width	4 feet one side ok	4 feet/Shared road	Shared road	Shared road
Street Lighting	At intersections and pedestrian scale lighting at residential driveways.	At intersections and pedestrian scale lighting at residential driveways.	At intersections and pedestrian scale lighting at residential driveways.	At intersection with road
<b>Intersections</b>				
Traffic control	Stop signs, 4-way yield	4-way yield	4-way yield	Yield exiting alley
Curb Radii	15-25 feet	15-25 feet	15-20 feet	15 feet

Source: Sustainable Neighborhood Road Design: A Guidebook for Massachusetts Cities and Towns, May 2011, American Planning Association, Massachusetts Chapter and Home Builders Association of Massachusetts (page 27 ).

## Cul de sacs

The required radius for a cul-de-sac also impacts the amount of impervious area. In the Pioneer Valley, minimum cul-de-sac radius requirements (at outer road edge) are typically set between 60 and 120 feet, and hammerhead turnarounds, which would greatly reduce impervious cover, are not typically allowed. Better stormwater management recommendations often call for cul-de-sacs to be designed with an outer road radius of 30 to 40 feet, as well as allowing for hammerhead turnarounds in lieu of cul-de-sacs.

Also in subdivision regulations, there are opportunities to reduce the required radius of a cul-de-sac (down to an outer road radius of 30 to 40 feet), and to allow hammerhead turnarounds. On dead-end streets, hammerhead turnarounds can provide a feasible way to reduce paved area while providing sufficient turnaround space for larger fire vehicles.

- » E. Cul de sac or dead end street -- Revise cul de sac requirements for granite curbing to allow bioretention area on landscaped island (soils permitting). This could entail curbing that is perforated to allow for the flow of runoff to the bioretention area;

- » Minimize the required radii for cul-de-sacs - radius of 35 feet is optimal, depending on emergency vehicles;
- » Minimize the number of residential street cul-de-sacs and incorporate landscaped areas to reduce their impervious cover. The radius of cul-de-sacs should be the minimum required to accommodate emergency and maintenance vehicles. Alternative turnarounds should be considered.



*Cul-de-sac infiltration island accepts stormwater from surrounding pavement. Note flat curb.*



The cross section drawing to left shows how a cul de sac can be designed to serve as a bioretention area for stormwater runoff. The photo to the right shows a bioretention cul de sac in Waterford, Connecticut, that is designed to collect and filter roadway runoff from a residential development.

## Curbs

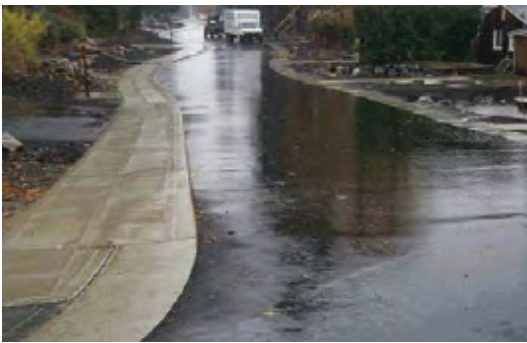
Currently subdivision regulations typically call for the use of curb and gutter infrastructure connected to storm sewer infrastructure. This traditional approach produces stormwater flows that have greater impacts on local rivers and streams. As an alternative, regulations can promote roads without curbs where appropriate or the use of “perforated curbs.” Perforated curbs are curbs with gaps that allow stormwater to move from the street through to a stormwater management facility that could include swales or planters, such as tree box filters. (See image on the following page.)

Another alternative involves the use of “invisible curbs.” Invisible curbs are granite curbs that are buried along the street edge so as to allow stormwater to flow over into a stormwater management facility. Invisible curbs provide the structural support needed to plow from curb to curb, thereby retaining the desired roadway width even in snowy conditions. (See images on the following page.)



Perforated Curbs

Perforated curbing allows stormwater to enter planters that are designed to soak up rainfall.



Invisible Curbs

"Invisible" curbs along the street edge allow runoff to move into bioretention swales.

## Drainage

Standards for drainage within the subdivision regulations should encourage and even require better site design with a low impact development approach that includes:

- » conservation of open space, natural drainage systems, native vegetation and other resources on site;
- » minimizing and disconnecting impervious surfaces;
- » clustering, and eliminating impervious surfaces that are connected to the municipal stormwater system; effective BMP selection and placement

This section should also refer to and be consistent with the stormwater management bylaw/ordinance. It should identify which size projects require a stormwater management permit, and what are the design parameters for drainage (i.e., water quality volume treatment, which targets pollutant transport; channel protection volume, which targets erosion; and overbank and extreme flood protection). For communities that have adopted for upland areas the *Massachusetts Stormwater Handbook*, the design parameters with Standard 2 address downstream and off-site flooding. It requires that the post-development peak discharge rate is equal to or less than the pre-development rate from the 2-year and the 10 year 24 hours storms. The Model LID Bylaw prepared

by the Massachusetts Executive Office of Energy and Environmental Affairs suggests performance standards that go further, including treatment of discharges and protection for channels, overbank flooding, and extreme flooding.

The drainage section should also address requirements for bridge openings and major culverts. There are now important habitat preservation and climate change adaptation considerations that ought to be considered in the design of these facilities. *The Massachusetts River and Stream Crossing Standards* should be referenced as an important resource for design of these facilities.

## Sidewalks

In addition to roadways, sidewalks provide another important opportunity to reduce impervious area or provide better management of stormwater runoff. Regulations can promote a variety of strategies for achieving this, including:

**Use of porous surfacing material for sidewalks and bus waiting areas.** A recent publication on complete streets by the City of Boston that promotes the use of porous materials in certain sidewalk zones describes the advantages of this choice in paving:

Permeable pavements provide increased traction when wet because water does not pool, and the need for salt, sand, and plowing is reduced during winter due to low/no black ice development. Compared to traditional paving methods, long-term maintenance costs may be lower in cold climates since permeable pavements resist cracking and buckling in freeze-thaw conditions. Nevertheless, permeable paving requires regular maintenance including: annual inspection of paver blocks for deterioration; periodic replacement of sand, gravel and vegetation; and annual industrial vacuuming of pavements to unclog sand and debris (Note: The use of sand in ice prevention should be avoided because it will clog pavement pores.)<sup>3</sup>

**Flexibility in sidewalk standards to accommodate best management practices.** This might include allowing alternatives to the minimum sidewalk standards or alternatives to sidewalk layout where pedestrian circulation makes use of common areas rather than street rights of way.

**Grading of impervious sidewalk surfaces to direct stormwater runoff to bioretention areas** or other such facility to eliminate or keep flow out of the municipal storm drain system

## Utilities

Rather than require all electric, telephone, cable TV, fiber optic, and other conduits to be installed away from the road and its edge, allow placement of utilities under the paved section of the right of way. This creates essential space along the roadway edge for stormwater management facilities.

Often there is concern that such placement of utilities under the road will result in traffic delays and additional costs to utility companies. In the *Rhode Island LID Site Planning and Design Guidance for Communities*, however, authors from the Horsley Witten Group

note that the reality is, “The amount of pavement needed to be removed during such operations can be decreased through better diagnostic tests and trenchless technologies for utility construction and repair.”

If the idea of putting utilities under the road edge is too great a concern for Departments of Public Works, then the next best strategy is to place utilities directly abutting roadway pavement, within 1 to 2 feet.

## Landscaping and trees

Trees, shrubs, and ground covers are essential to good stormwater management. Leaves, needles, branches, and bark intercept rainfall so that it can then evaporate to the atmosphere. Leaf litter and mulch on the ground creates a spongy surface for retention of stormwater. Rainfall that reaches the roots is taken up into plants and then transpired to the atmosphere. Roots also help to stabilize soils and prevent erosion.

Subdivision regulations can recognize these important benefits through the following:

- » Encourage both preservation of existing stands of trees and mature trees on site as well as plans that incorporate trees into stormwater management practices. This can be done through specific requirements and through a system of credits. Calculating stormwater benefits of certain species based on size can be done through the National Tree Benefit Calculator at: [www.treebenefits.com/calculator/](http://www.treebenefits.com/calculator/)
- » Allow for bioretention areas or other vegetated stormwater facilities within treebelt areas and to count toward other required landscaping features, including site, parking or perimeter screening. This creates areas that function on several levels, including aesthetics and stormwater management.

## LINKS TO MORE INFORMATION

AHBL FOR PUGET SOUND PARTNERSHIP. NOVEMBER 2011. INTEGRATING LID INTO LOCAL CODES: A GUIDEBOOK FOR LOCAL GOVERNMENTS. SEE:

[http://www.psp.wa.gov/LID\\_GLG.php](http://www.psp.wa.gov/LID_GLG.php)

AMERICAN PLANNING ASSOCIATION, MASSACHUSETTS CHAPTER, AND HOME BUILDERS ASSOCIATION OF MASSACHUSETTS. MAY 2011. "SUSTAINABLE NEIGHBORHOOD DESIGN: A GUIDEBOOK FOR MASSACHUSETTS CITIES AND TOWNS." SEE:

[www.apa-ma.org/apa-ma\\_documents/.../NRB\\_Guidebook\\_2011.pdf](http://www.apa-ma.org/apa-ma_documents/.../NRB_Guidebook_2011.pdf)

CENTER FOR WATERSHED PROTECTION AND USDA FOREST SERVICE. "USING TREES TO REDUCE STORMWATER RUNOFF." FOR THIS POWERPOINT PRESENTATION, SEE:

<http://www.slideshare.net/watershedprotection/using-trees-to-reduce-stormwater-runoff-formatted-presentation?type=powerpoint>

ALSO SEE WEB PAGE RELATED TO THIS COLLABORATION:

<http://www.forestsforwatersheds.org/reduce-stormwater/>

LAWRENCE, TIMOTHY AND MYERS, MONIQUE. 2009. "EMERGENCY SERVICES AND STORM WATER MANAGEMENT." CALIFORNIA SEA GRANT PROGRAM. SEE:

[www-csgc.ucsd.edu/BOOKSTORE/Resources/LID\\_FACTSHEET.pdf](http://www-csgc.ucsd.edu/BOOKSTORE/Resources/LID_FACTSHEET.pdf)

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT AND COASTAL RESOURCES MANAGEMENT COUNCIL. MARCH 2011. "RHODE ISLAND LOW IMPACT DEVELOPMENT SITE PLANNING AND DESIGN GUIDANCE MANUAL." SEE:

[www.dem.ri.gov/programs/bpoladm/suswshed/pdfs/lidplan.pdf](http://www.dem.ri.gov/programs/bpoladm/suswshed/pdfs/lidplan.pdf)

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1 In his presentation, "Right Practice, Right Place: Green Infrastructure Technologies that Work in New England" at EPA's Growing Your Green Infrastructure Program, December 2012, Robert Roseen noted that in addition to reducing the number of acres to be cleared, the developer was able to avoid the use of 1,616 feet of curbing, 785 feet of pipe, 8 catch basins, 2 detention basins, and 2 outlet control structures.

2 Information on the LID Site Design Credit is found in Volume 3 of the Massachusetts Stormwater Handbook.

3 For more information, see the document from which this quote is drawn:  
[http://www.bostoncompletestreets.org/pdf/2/chap2\\_5\\_sidewalk\\_materials.pdf](http://www.bostoncompletestreets.org/pdf/2/chap2_5_sidewalk_materials.pdf)

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# Paying for Green Infrastructure

## WHAT IT IS

Paying for green infrastructure projects can happen in a variety of ways. Green infrastructure facilities can be integrated into projects where stormwater management is already a component. This often presents important savings in avoided costs. Green infrastructure can also be paid for through a variety of mechanisms, including: stormwater utilities, fees tied to permitting, connection fees, establishment of betterments and management districts, bonds and loans, and sponsorships. While stormwater utilities are covered in a separate fact sheet within this series, the other financing mechanisms are described in more detail below.

## AN INTEGRATED APPROACH

Wherever there are considerations of stormwater management, as there are in most public development or redevelopment projects, there is a role for green infrastructure. Funding for green infrastructure work can come from a variety of sources already used to cover the costs of such projects, including roads, combined sewers, railways, sidewalks, and schools. See diagram below.



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## Opportunities for Integrating Green Infrastructure with Other Projects

Recognizing the full value of green infrastructure can be an important impetus for integration of such facilities in existing projects. These are often referred to as secondary benefits. These are not typically part of stormwater projects that rely solely on traditional “gray”/underground infrastructure. Secondary benefits include: social, such as avoided flooding and healthier neighborhoods; economic, such as job creation and increased property values; and environmental such as cleaner waters and improved air quality. This more comprehensive accounting method is known as the “Triple Bottom Line” of green infrastructure used most notably by Philadelphia in their planning for green infrastructure. (For more information on the Triple Bottom Line approach, see Philadelphia’s Long Term Control Plan Update (2009).) By integrating green infrastructure across the range of municipal projects while also accounting for all of the benefits to be derived, proponents can think more broadly and call on a far wider range of sources for project funding. (See Pioneer Valley Green Infrastructure Plan, page 82-84 for matrix showing Potential Sources for Enhanced Project Funding at: <http://www.pvpc.org/plans/pioneer-valley-green-infrastructure-plan> .

The City of Lancaster, Pennsylvania, accounted for these benefits in terms of “avoided costs or savings.” With a goal of reducing annual average stormwater runoff by 1.053 billion gallons within the next 25 years, the city developed a study—drawing from their green infrastructure plan and a national valuation guide. The study involved placing a value on practices, such as bioretention and other infiltration practices by monetizing the benefits of services, such as: improved water quality, increased groundwater recharge, reduced flooding, reduced energy use, and reduced atmospheric CO2. The result is projections showing significant annual avoided costs/savings at the end of the 25-year implementation period. See table below.

Projected annual avoided costs/savings in Lancaster, PA, case study (benefits accrued at end of 25-year implementation period)	
\$122.4 billion per year	Water - Avoided costs for wastewater treatment and the use of traditional “gray infrastructure” through green roofs, tree planting, permeable pavement, bioretention and infiltration practices, and water harvesting
\$2,368,000	Energy - Reduced electricity and natural gas usage due to green roofs, tree planting, water harvesting, providing insulation shading, wind blocking, and evaporation

\$1,023,000	Air quality - Reduced emissions of nitrogen dioxide, ozone, sulfur dioxide, and particulate matter due to uptake and absorption, reduced energy emissions, reduced ozone with trees, green roofs, permeable pavement, and bioretention and infiltration practices
\$786,000	Climate change-related benefits in reduced CO2 through direct carbon sequestration, reduced water and wastewater treatment, reduced energy production due to vegetation and permeability.

Source: Webinar presented by Hal Sprague of Center for Neighborhood Technology, Valuing Green Infrastructure: Economic, Environmental, and Social Benefits, September 26, 2013, for the Vermont Agency of Natural Resources.

### Portland Takes Direct Approach

A national leader in green infrastructure, the City of Portland, Oregon, took a direct approach to integrating green infrastructure into projects as a way to abate stormwater flows into the combined sewer system. One strategy entailed adopting a green streets policy whereby all City of Portland funded development, redevelopment or enhancement projects meeting the threshold in their stormwater management manual (of developing or redeveloping 500 square feet of impervious surface) must incorporate green street facilities.<sup>1</sup> This policy led to what EPA has described as, “...a formal process to overlay multi-bureau project plans and scheduled capital improvement projects to identify how public and private projects can achieve multiple community and environmental benefits through green infrastructure.”<sup>2</sup> To cover the costs of green streets projects, Portland supplemented funds from general budget and capital improvement funds with innovation grants from EPA, revenue from a stormwater utility fee and from a one percent tax on construction projects that cannot meet the City’s stormwater management regulations. What they learned, as did other case study communities examined by EPA, is that the increased investment necessary to include green infrastructure in large undertakings is typically a very small percentage of the total project costs. In addition, the use of green infrastructure elements can also decrease overall project costs, particularly with reductions in use of concrete or asphalt. Portland’s story underscores how integrating or overlapping green infrastructure with street development, redevelopment, or enhancement can yield tremendous value. For Pioneer Valley cities and towns where might there be other possibilities of overlap that may be worth exploring?

## STORMWATER PERMIT FEES

Stormwater permit fees address potential stormwater impacts related to new construction. The fees are typically site specific and can be an unreliable source of funding when development slows.

Currently, three communities in the region assess stormwater permit fees to review and permit new development projects (Agawam, Northampton, and Wilbraham). While there is no direct connection between these permit fees and funds to maintain the stormwater system, stormwater permit fees are paid into general funds, and most communities pay for stormwater system maintenance from the general funds. In a sense, then, some part of these permit fees may help to cover some stormwater system maintenance costs.

## CONNECTION FEES

Northampton is one community that currently charges a fee for a property's initial connection to the stormwater system. Connection fees for stormwater might be augmented based on a practice in Westfield relative to wastewater. The City of Westfield established a connection fee associated with new sewer hook ups aimed at helping to increase capacity at the wastewater treatment plant (where the City was reaching capacity). For every new gallon of sewage to be generated, the customer pays a fee equivalent to the cost of fixing 5 gallons worth of infiltration and inflow. It may be worth exploring whether this same strategy could be applied to stormwater whereby new connections to the system help to mitigate other flows into the system, thereby preserving capacity and avoiding the need for costly expansion projects.

## BETTERMENTS AND MANAGEMENT DISTRICTS

MGL Chapter 80 allows for the assessment of cost of public improvements by municipalities. Whenever a certain location or district receives exclusive benefit or advantage from a public improvement, betterments can be assessed in that area for the improvement. This could be the case where several neighborhoods in a town require improved stormwater infrastructure. The cost of improvements can be offset by charges to those properties located within that jurisdiction.

To implement the Long Creek Watershed Management Plan in Maine (the result of a citizen's lawsuit over impaired waters), landowners in four municipalities joined forces to create the Long Creek Watershed Management Plan District. The District collects fees from property owners and uses the money to restore Long Creek and install stormwater retrofits. The fee is \$3,000 per acre of impervious surface per year.



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## BONDS AND LOANS

Bonds are useful to initiate large capital projects, but they involve borrowing money and accruing debt. MassDEP's Clean Water State Revolving Loan Fund (SRF) has been an important source for low interest loans for many water infrastructure projects in the Pioneer Valley.

A 2014 letter from MassDEP Division Municipal Services Director Steve McCurdy, notes that MassDEP will receive a \$47.6 million federal grant to subsidize the CWSRF program and that at least 10 % of these monies must be dedicated in 2014 to Green Infrastructure projects or components as defined by EPA. The 2014 Intended Use Plan lists 12 new Green Infrastructure construction projects in Massachusetts and 3 additional Green Infrastructure construction projects are on the 2014 Carry-Over list. "The exact monetary value of the Green components of these projects will be determined when project applications are submitted, but are expected to be well in excess of the \$4.76 million requirement," he concludes.

In addition, the SRF program has offered principal forgiveness for Environmental Justice projects, those projects occurring in areas defined to be a neighborhood with annual median household income (MHI) less than 65 percent of the state MHI.

## SPONSORSHIPS

Several communities have been able to tap into local businesses to provide donations and sponsorships for green infrastructure projects.

In Portland, Maine, businesses helped to cover \$20,000 of the \$64,000 cost for a demonstration rain garden along the tidal Back Cove. The garden covers 2.5 acres of land adjacent to a popular recreational trail that is heavily used by walkers, joggers, and cyclists. The project's popularity led to the installation of a second rain garden adjacent to the trail's parking area, which was designed and funded by Stantec, a national engineering firm with local offices. Signage at the rain gardens highlights corporate sponsors.<sup>8</sup> This idea builds on the successful Adopt a Trail corporate sponsorship program run by Portland's local land trust.

In Lynchburg, Virginia, a new corporate sponsorship program is drawing funding for the installation of demonstration rain gardens in prominent public places throughout the City. Each garden is sponsored by a local business, which is then credited with an attractive sign onsite. To date, this program has raised over \$1.6 million and established 50 gardens.



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Virginia also has a related statewide program called Streetscape Appearance Green Enhancement (SAGE), a comprehensive roadside management program that has been in existence since 2006. Funded entirely by donations, but managed by municipalities, the program aims to beautify local streetscapes, boost civic and community pride, and facilitate future economic development. Municipalities manage the donations through a 501(c)3 non-profit and contributions are organized so as to cover construction, maintenance, and renewal, typically after 5 years.

## OTHER POTENTIAL AND FUTURE SOURCES

### Hazard Mitigation Funding

Though green infrastructure implemented area wide could help to mitigate natural hazards and build community resiliency, grant programs out of the Massachusetts and Federal Emergency Management Agencies do not as of yet provide opportunities for funding of green infrastructure stormwater management projects. The Massachusetts Emergency Management Grant Program's State Hazard Mitigation Officer Richard Zingarelli notes:

Standard hazard mitigation projects require a benefit-cost analysis that shows that the cost of the project is exceeded by the benefit as measured by direct reduction of damages from natural hazards. The difficulty is that it is difficult, if not impossible, to quantify a direct reduction in damage that results from measures like green roofs and porous pavement. As a result, any limited eligibility for funding in these programs would fall under the "5% Initiative" of the Hazard Mitigation Grant Program (HMGP), which allows for setting aside up to 5% of the total available HMGP funding for activities that are difficult to evaluate using traditional cost-effectiveness criteria.

It is important to know that the use of the word "mitigation" in emergency preparedness means avoidance and preparation (resiliency) and is more closely linked to the concept of "adaptation" in climate change.

## WATER QUALITY CREDITS TRADING

Water quality trading is a market-based approach—an idea that has emerged from the energy market—that enables jurisdictions to achieve needed pollution controls through the purchase of credits for a particular pollutant. Landowners can produce water quality credits by implementing green infrastructure practices that reduce volume and pollutants, and typically at a much lower cost than a municipal treatment facility. EPA notes, "Through water quality trading, facilities that face higher pollutant control costs to meet their regulatory obligations can purchase pollutant reduction credits from other sources that can generate these reductions at lower cost, thus achieving the same or better overall water quality improvement. In most cases, trading takes place on a watershed level under a pollutant cap (the total pollutant load that can be assimilated by a waterbody without exceeding water quality standards) developed through the TMDL

process or a similar type of water quality analysis that produces information on pollutant loadings and resulting water quality conditions.”

For the Long Island Sound TMDL, the state of Connecticut adopted trading legislation. Public Act No. 01-180, which establishes the trading framework for a Long Island Sound Nitrogen Credit Exchange Program to be directed by a Nitrogen Credit Advisory Board appointed by the General Assembly and the governor. EPA notes, “The Nitrogen Credit Exchange Program establishes a well-defined trading structure supported and regulated by limits mandated in state law. The state legislation specifies trading ratios (e.g., delivery and location ratios) and accounting methodologies to formalize all calculations used in trading.”

## LINKS TO MORE INFORMATION

ENVIRONMENTAL FINANCE CENTER UNIVERSITY OF MARYLAND. 2014. LOCAL GOVERNMENT STORMWATER FINANCING MANUAL: A PROCESS FOR PROGRAM REFORM. SEE:

[http://efc.umd.edu/assets/efc\\_stormwater\\_financing\\_manual\\_final\\_\(1\).pdf](http://efc.umd.edu/assets/efc_stormwater_financing_manual_final_(1).pdf)

NATURAL RESOURCES DEFENSE COUNCIL. FEBRUARY 2012. FINANCING STORMWATER RETROFITS IN PHILADELPHIA AND BEYOND. SEE:

<http://www.nrdc.org/water/files/stormwaterfinancing-report.pdf>

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY. 2013. COMMUNITY BASED PUBLIC PRIVATE PARTNERSHIPS FOR GREEN INFRASTRUCTURE-DRIVEN STORMWATER RETROFITS: A WEBINAR.

ENVIRONMENTAL FINANCE CENTER, UNIVERSITY OF NORTH CAROLINA. 2014. A CATALOG OF FINANCE PUBLICATIONS ON GREEN INFRASTRUCTURE APPROACHES TO STORMWATER MANAGEMENT. SEE:

<http://www.efc.sog.unc.edu/reslib/item/catalog-green-infrastructure-and-stormwater-finance-publications>

USEPA. 2009. FUNDING STORMWATER PROGRAMS FACTSHEET. SEE:

[www.epa.gov/region1/npdes/stormwater/assets/pdfs/FundingStormwater.pdf](http://www.epa.gov/region1/npdes/stormwater/assets/pdfs/FundingStormwater.pdf)

CHARLES RIVER WATERSHED ASSOCIATION FOR MA COASTAL ZONE MANAGEMENT. 2007. ASSESSMENT OF STORMWATER FINANCING MECHANISMS IN NEW ENGLAND. SEE:

[www.crwa.org/projects/stormwater/Municipal%20SFM%20Case%20Studies%20Repo.pdf](http://www.crwa.org/projects/stormwater/Municipal%20SFM%20Case%20Studies%20Repo.pdf)

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# Stormwater Utilities

## WHAT IT IS

For many cities and towns there are significant costs associated with operating, maintaining, and upgrading stormwater infrastructure. The municipal system for capturing and conveying stormwater from rooftops, driveways, and roadways can include the hundreds of catchbasins along street edges and miles of underground pipes.

Establishing a stormwater utility is one important strategy to creating a reliable funding source for this work. Currently there are between 1,500 and 2,000 stormwater utilities in the United States, 5 of which are located in Massachusetts (Fall River, Newton, Northampton, Reading, and Westfield).

Most municipalities in the Pioneer Valley rely on allocations from the general fund to service stormwater infrastructure. These allocations, however, are not keeping pace with actual needs for upgrading aging systems, reducing localized problems—such as flooding and erosion—and meeting regulatory requirements for environmental protection.

A stormwater utility operates much like an electric or drinking water utility. Fees collected from property owners go into a dedicated fund to pay specifically for the work of operating, maintaining, and improving stormwater infrastructure. This reinforces the idea that like other utilities, stormwater management is a public service. Monies can be used to pay for operation and maintenance expenses, project or capital-related expenditures, staffing, engineering, permitting, inspection, and program management costs.

In 1998, the City of Chicopee was the first municipality in Massachusetts to collect a fee for maintenance and upgrade of stormwater infrastructure, but the program is technically not a “stormwater utility” as funds go into a water pollution control account that also receives funding for projects that include the sanitary sewer system. So the program is referred to simply as a “stormwater fee.”

## HOW IT WORKS

Since impervious surfaces (roofs, driveways, and roadways) are what produce the runoff from rainfall and snowmelt that must be managed, stormwater utility rates are most commonly based on the amount of impervious surface on a property. For residential customers, many municipalities set rates according to a method called Equivalent Residential Unit (ERU). This unit is derived from the impervious area footprint of a typical single-family home. The City of Newton, Massachusetts, for example, currently has an ERU of 3,119 square feet. Each residential property is thus billed \$25 per year based on this average of 1 ERU. Non residential

properties, including industrial and commercial properties are billed based on 6 ERUs or \$150 per year. The City has been exploring a different rate structure for residences of more than three households and commercial and industrial properties since the current flat rate of 6 ERUs has properties with small impervious areas (small downtown shops, etc.) paying the same as properties with large impervious areas (shopping malls). The new rate would assign a certain number of ERUs to a commercial and industrial property based on actual impervious area. Rates for larger properties in some municipalities are sometimes not based on ERUs, but rather a dollar per unit cost based directly on the area of impervious surface on a property.

A guidance document prepared by the National Association of Flood and Stormwater Management Agencies notes, “The fundamental objective of a stormwater utility/service fee is attainment of equity. Service fee rate methodologies are designed to attain a fair and reasonable apportionment of cost of providing services and facilities.”

### Enabling Legislation

In Massachusetts there are two companion pieces of legislation that allow municipalities to set up stormwater utilities: MGL Chapter 83 Section 16 and MGL Chapter 40 Section 1A. The first, MGL Chapter 83 Section 16, is relatively new enabling legislation that allows municipalities to set up a stormwater management utility and charge utility fees for managing stormwater. The second, MGL Chapter 40 Section 1A, provides a definition of a district for the purpose of water pollution abatement, water, sewer, and/or other purposes. Together, these two pieces of legislation allow a municipality to set up an authority to manage stormwater and to charge utility fees for managing stormwater.



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## WHERE THEY ARE USED CURRENTLY IN MASSACHUSETTS

Two of Massachusetts' five stormwater utilities are located in the Pioneer Valley. (See table below.) The cities of Northampton and Westfield are currently the only municipalities in the region with programs that collect fees specifically dedicated to maintenance and upgrade of stormwater infrastructure. Westfield instituted a stormwater utility in 2010 for the purpose of financing a stormwater management division, responsible for meeting federal requirements for stormwater monitoring and maintaining the City collection system. Northampton adopted a stormwater utility in 2014 to generate funding for meeting federal permit requirements and attending to aged stormwater and flood control infrastructure.

There are roughly 6,600 smaller residential properties (1-3 family) in Northampton. Under the billing formula these properties are divided into four groups based on the impervious surface area on each property. All properties within each group pay the same fee. This standard fee is calculated based on the average impervious and pervious areas for all properties within each group. Based on the annual budget of \$1,980,056, the annual residential fees are estimated to be:

### Stormwater Utilities/Fees in Massachusetts

Community	Date Created	Equivalent Residential Unit (ERU)*	Fee	Annual Revenue
Chicopee	1998	2,000 s.f.	Single family residential at \$100 per year Multi family, industrial, commercial properties at \$1.80 per 1,000 square feet, with a minimum charge of \$100 per year and a maximum charge of \$640 per year	\$1,500,000 (2012)

Fall River	2008	2,800 s.f.	Residential: 1 to 8-family at \$140 per year  Commercial, industrial and residential properties greater than 8 family at \$140 per year for 2,800 square feet of impervious surface	\$4,660,000 (2012)
Newton	2006	3,119 s.f. Proposed change: 2,600 s.f.	Residential at \$25 per year, with those receiving elderly discount, \$17.52 per year  Non residential at \$150 per year (Proposed change involves replacing the flat fee with a fee based on area of imperviousness. This would include residences with 3 or more units.)	\$725,000 (2012)
Northampton	2014		1 to 3 family homes annual residential fee estimated to be:  \$63.94 for impervious area <2,250 sq. ft.  \$91.05 for impervious area 2,250 to 3,056 sq. ft.  \$125.61 for impervious area 3,056 to 4,276 sq. ft.  \$259.07 for impervious area >4,276 sq. ft.	\$2,000,000 (estimated)
Reading	2006	2,552 s.f.	Single and two-family residences at \$40 per year  Multi-family, commercial, and industrial properties at \$40 per 3,210 square feet annually	\$357,000 (2012)

Westfield	2010	NA	Residential at \$20 per year Commercial properties at \$.045 per 1,000 square feet up to a maximum of \$600 per year	\$560,000 (2012)
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\*Residential customers are typically billed for stormwater runoff based on the Equivalent Residential Unit (ERU). An ERU is based on the amount of impervious surface area or percent impervious area found at the typical single-family home within the municipality.

## DISCOUNTS AND CREDITS

Local governments with stormwater utilities can encourage better practices on private property by reducing fees in exchange for facilities that reduce the need for service by the municipal stormwater system. Discounts and credits can be geared to promote impervious surface reductions, onsite management or volume reduction, or the use of specific practices, such as raingardens/bioretention facilities, drywells, cisterns, or green roofs.

The City of Chicopee has just begun to implement a “Rain Smart Rewards” ordinance that offers a stormwater fee reduction of up to 50 percent in exchange for implementation of improved stormwater management practices by property owners.

In Minneapolis, Minnesota, 50 percent of the stormwater fee can be waived if the property owner can demonstrate that the runoff from a 10-year, 24-hour storm event can be managed on site. If a property owner can demonstrate that the runoff from a 100-year, 24-hour storm event can be managed on site, the entire stormwater fee is waived.

Portland, Oregon’s Clean River Rewards program provides stormwater utility fee discounts to encourage residential and commercial property owners to manage stormwater on site (35 percent discounts) and/or on the public right of way that serves their property (65 percent discounts). Partial credits are also given for ecoroofs, four or more trees over 15 feet tall, and for properties with less than 1,000 square feet of imperviousness. There is a Residential Discount Calculator and a Commercial Discount Calculator on the program’s website so that property owners can calculate what changes they might make to obtain certain savings.

Starting July 1, 2014, credits in Northampton will be available for small residential stormwater improvements (rain gardens and porous driveways), construction and maintenance of larger stormwater best management practices, protected open land, commonly owned undeveloped properties and educational programs. Senior (needs-based), low income, and protected land credits are automatically applied based on documentation by the Northampton Assessor’s Office. All other credits will require submission of an application and other documentation.

## BENEFITS

Establishing a stormwater utility is no easy task. It requires tremendous effort in terms of education and politics. The process, however, helps everyone to understand the service provided by the municipal stormwater system and the significant costs of operating, maintaining, and improving this infrastructure. In the end, the utility provides a dedicated and stable source of funding to maintain and upgrade an aging system, reduce localized problems—such as flooding and erosion, and meet regulatory requirements for environmental protection.

A stormwater utility has other benefits as well:

- » **Creates an equitable way to pay for stormwater services, especially if the fee structure is based on the amount of impervious surface. Discounts or offsets can be provided to low-income residents or elderly, further ensuring the fee's equitability.**
- » **Tax-exempt properties like universities, hospitals, and places of worship are required to pay the fee, so that they help cover the cost of services they receive**
- » **Typically easier for the municipality to institute than other forms of funding. "In many communities, new taxes require a vote of approval by the public, while a fee is a charge that municipalities have the authority to leverage for the services they provide."**<sup>6</sup>
- » **May enable municipalities to consolidate or coordinate responsibilities previously dispersed among several departments and develop programs that are comprehensive, cohesive, and consistent year to year**
- » **Creates funding that can be leveraged to meet grant and bond requirements**
- » **If a credit or reduction is offered, the fee can become an incentive for improved stormwater management on private property thereby reducing the service demand on the municipal system**

## IMPORTANT CONSIDERATIONS

To achieve desired objectives, several considerations should be taken into account when proposing and establishing a stormwater utility:

Start with a thoughtful outreach campaign that generates enthusiasm for the community's stormwater vision. If property owners understand the benefits they will receive, they are more likely to support the fee. As part of this, it is important to work in advance with religious institutions, private schools, hospitals, and non profits to be clear that the utility is like other utilities that they must pay. And education should be ongoing.

As part of setting rates and calculating bills, develop a sound methodology with rigorous quality assurance. GIS mapping should be integral to this method if area of impervious cover is a factor in setting rates.

Set rates so that the fee provides adequate revenue to achieve stormwater goals. If the fee is unreasonably high, it will not be supported. If it is too low, promised benefits will not materialize and public support is likely to erode.

Give some advance thought to determining how stormwater utility fees can be collected. Typically, they have been collected either on a separate bill, added to a water collection bill, or added to the property tax bill.

Be sure that the greatest costs are directed toward those who create the most runoff, particularly commercial and industrial facilities with large areas of impervious cover, rather than residential and other properties with low impervious cover.<sup>7</sup> At the same time, municipalities should be sensitive to where residents may already be paying stormwater management fees through homeowner associations.

Ensure that fees do not harm low-income residents, as in Detroit, where an increase in stormwater fees caused some low-income residents to be unable to pay their water bill and have their water turned off. Sliding fee scales, bill discounts, crisis vouchers, and zero interest loans for qualified customers are options for offsetting the burden on lower income residents.

## LINKS TO MORE INFORMATION

METROPOLITAN AREA PLANNING COUNCIL. 2013. STORMWATER UTILITY FUNDING STARTER KIT. SEE:

<http://www.mapc.org/stormwater-utility-funding-starter-kit>

(Note: A well done update of PVPC's 1998 kit called, "How to Create a Stormwater Utility.")

ROSS STRATEGIC AND INDUSTRIAL ECONOMICS, INC. FOR US EPA, REGION 1. 2013. EVALUATION OF THE ROLE OF PUBLIC OUTREACH AND STAKEHOLDER ENGAGEMENT IN STORMWATER FUNDING DECISIONS IN NEW ENGLAND: LESSONS FROM COMMUNITIES. SEE:

<http://www.epa.gov/evaluate/pdf/water/eval-sw-funding-new-england.pdf>

WESTERN KENTUCKY UNIVERSITY. 2012. STORMWATER UTILITY SURVEY. SEE:

<http://www.wku.edu/engineering/civil/fpm/swsurvey/>

ENVIRONMENTAL FINANCE CENTER, UNIVERSITY OF NORTH CAROLINA. 2012. STORMWATER UTILITY DASHBOARD. SEE:

[http://efc.unc.edu/tools/NCStormwaterDashboard\\_2012.html](http://efc.unc.edu/tools/NCStormwaterDashboard_2012.html)

DELANY, JOE, K. HONETSCHLAGER, AND T. MCINTIRE. 2009. STRUCTURING A STORMWATER UTILITY. TOWN OF READING, MA. SEE:

<http://www.salemsound.org/PDF/ReadingStormwaterUtility.pdf>

USEPA. 2009. FUNDING STORMWATER PROGRAMS FACTSHEET. SEE:

[www.epa.gov/region1/npdes/stormwater/assets/pdfs/FundingStormwater.pdf](http://www.epa.gov/region1/npdes/stormwater/assets/pdfs/FundingStormwater.pdf)

CHARLES RIVER WATERSHED ASSOCIATION FOR MA COASTAL ZONE MANAGEMENT. 2007. ASSESSMENT OF STORMWATER FINANCING MECHANISMS IN NEW ENGLAND. SEE:

[www.crwa.org/projects/stormwater/Municipal%20SFM%20Case%20Studies%20Repo.pdf](http://www.crwa.org/projects/stormwater/Municipal%20SFM%20Case%20Studies%20Repo.pdf)

NEW ENGLAND ENVIRONMENTAL FINANCE CENTER. 2005. STORMWATER UTILITY FEES: CONSIDERATIONS AND OPTIONS. SEE:

<http://efc.muskie.usm.maine.edu/docs/StormwaterUtilityFeeReport.pdf>

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# Green Roof Model Incentives

The following green roof model incentives are excerpted from municipal bylaws, regulations and policies from around the United States, and offer example language for customizing incentives to meet the needs of your municipality.

## FLOOR AREA RATIO BONUS

### City of Portland Zoning Code Title 33, Chapter 33.510 Central City Plan District

Rooftop Gardens Option In CX, EX, and RX zones outside of the South Waterfront Subdistrict, developments with rooftop gardens receive bonus floor area. For each square foot of rooftop garden area, a bonus of one square foot of additional floor area is earned. To qualify for this bonus option, rooftop gardens must meet all of the following requirements.

- a. The rooftop garden must cover at least 50 percent of the roof area of the building and at least 30 percent of the garden area must contain plants.
- b. The property owner must execute a covenant with the City ensuring continuation and maintenance of the rooftop garden by the property owner. The covenant must comply with the requirements of 33.700.060.

## GREEN ROOF POLICY

### City of Portland, Green Building Policy

NOW THEREFORE, BE IT RESOLVED that the Portland City Council amends the City of Portland's Green Building Policy to direct all City Bureaus and the Portland Development Commission to:

- » Require design and construction of all new City-owned facilities to include an ecoroof with at least 70% coverage AND high reflectance, Energy Star-rated roof material on any remaining non-ecoroof roof surface area; OR, Energy Star-rated roof material when an integrated ecoroof/Energy Star-rated roof is impractical;

# GREEN ROOF BYLAW

## Toronto, Canada Green Roof Bylaw

<http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=83520621f3161410VgnVCM10000071d60f89RCRD&vgnnextchannel=3a7a036318061410VgnVCM10000071d60f89RCRD>

Toronto Municipal Code Chapter 492, Green Roofs

The Bylaw applies to new building permit applications for residential, commercial and institutional development made after January 31, 2010 and will apply to new industrial development as of April 30, 2012. The full bylaw is available at the web link above.

§ 492-2. Green roofs required.

A. Every building or building addition constructed after January 30, 2010, with a gross floor area of 2,000 square meters or greater shall include a green roof with a coverage of available roof space in accordance with the following chart:

Gross Floor Area (Size of Building)	Coverage of Available Roof Space (Size of Green Roof)
2,000 — 4,999 m <sup>2</sup>	20%
5,000 — 9,999 m <sup>2</sup>	30%
10,000 — 14,999 m <sup>2</sup>	40%
15,000 — 19,999 m <sup>2</sup>	50%
20,000 m <sup>2</sup> or greater	60%

# GREEN PERMIT PROCESS

## City of Chicago Green Permit Process

[http://www.cityofchicago.org/city/en/depts/bldgs/supp\\_info/overview\\_of\\_the\\_greenpermitprogram.html](http://www.cityofchicago.org/city/en/depts/bldgs/supp_info/overview_of_the_greenpermitprogram.html)

Projects meeting the following criteria are eligible for the Green Permit Process:

- » Permit applications that include green technologies such as green roofs, rainwater harvesting, solar panels, solar thermal panels, wind turbine and geothermal systems are **REQUIRED** to be submitted through a Green Permit Program Project Administrator.
- » Commercial project participant must earn certification within the LEED rating system
- » Smaller Residential Project participant must earn certification under the Chicago



Green Homes Program checklist based rating system or LEED for Homes.

- » Green Menu Items – All Green Permit Program participants must utilize certain green strategies or green technologies to receive incentives offered by the Green Permit Program.
  - » Green roofs improve the urban environment by combating the urban heat island, reducing stormwater runoff, and reducing the energy use of the building beneath.
  - » For projects with no other green roof requirement, provide 50% green roof. For projects with a green roof required by Department of Planning and Development, add 25% to the DPD green roof requirement.

## GREEN ROOF FEE CREDIT

### City of Chicago Green Roof Fee Credit

[http://www.cityofchicago.org/content/dam/city/depts/bldgs/general/GreenPermit/Green\\_Roof\\_Checklistada.pdf](http://www.cityofchicago.org/content/dam/city/depts/bldgs/general/GreenPermit/Green_Roof_Checklistada.pdf)

FEE STRUCTURE	
<input type="checkbox"/> <b>Building Permit Fee</b>	Building permit fee calculation is based on building occupancy and area of work. Please visit our website for additional information and to use the permit fee calculator. <a href="http://www.cityofchicago.org/buildings">www.cityofchicago.org/buildings</a>
<input type="checkbox"/> <b>Green Roof Fee Credit</b>	A credit of \$0.05 per square foot of green roof provided will be applied to your total permit fee.
<input type="checkbox"/> <b>Building Permit Deposit</b>	50% of total building permit fee due at permit submittal meeting. Please make checks payable to <b>The City of Chicago Department of Revenue</b>

### Minneapolis Fee Reductions

[http://www.minneapolismn.gov/publicworks/stormwater/fee/stormwater\\_fee\\_stormwater\\_mngmnt\\_feecredits](http://www.minneapolismn.gov/publicworks/stormwater/fee/stormwater_fee_stormwater_mngmnt_feecredits)

The Stormwater Credit system provides:

- » Up to 50 percent credit (reduction) in your stormwater utility fee for management tools/practices that address stormwater quality
- » 50 percent or 100 percent credit (reduction) in your stormwater utility fee for management tools/practices that address stormwater quantity

Below is a partial list of stormwater BMPs approved for use in the Quality Credits program:

- » Rain Gardens
- » Pervious Pavers
- » Wet Ponds
- » Dry Wells
- » Sand Filters

- » Filter Strips
- » Infiltration trenches
- » Green Roofs

Only those properties that can demonstrate the capacity to handle a 10-year or 100-year rain event can receive a stormwater quantity credit. To apply for a stormwater quantity credit, property owners must have their applications certified by a state licensed engineer or landscape architect.

Property owners can apply for either the “Standard Quantity Reduction Credit” or the “Additional Quantity Reduction Credit.”

**Standard Quantity Reduction Credit.** The Standard Quantity Reduction Credit is a 50 percent credit on a property’s stormwater fee. The “Standard Quantity” credit is based on a property’s stormwater quantity management tools/practices being able to retain the 10-year, 24-hour type II SCS storm event. To qualify for this credit, the property owner must demonstrate that stormwater from the property is controlled with an on-site constructed stormwater quantity management tool/practice (BMP).

**Additional Quantity Reduction Credit.** The Additional Quantity Reduction Credit is a 100 percent credit on a property’s stormwater fee. To be eligible for the “Additional Quantity” credit, a property’s stormwater quantity management tools/practices must be able to retain the 100-year, 24-hour type II SCS storm event. To qualify for this credit, the property owner must demonstrate that stormwater from the property is controlled with an on-site constructed stormwater quantity management tool/practice (BMP).

You can learn more about stormwater quantity management tools/practices from the Minnesota Stormwater Manual.

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# Model Green Streets Policy Statement

A Green Streets policy can be adopted by a municipality to encourage the transformation of impervious city street surfaces into landscaped green-spaces that capture stormwater and recharge it on sight.

## Model Policy from Northampton Massachusetts

### In City Council, October \_\_\_\_, 2014

Ordered, that the City adopt a Green Streets and Infrastructure Policy

WHEREAS, Stormwater runoff from streets, roads, parking lots, roofs and other impervious urban surfaces is a significant source of water pollution to our rivers, streams and water bodies, and also is a key contributor to inflow into sanitary sewers; and

WHEREAS, Green Streets may provide cost-effective infrastructure solutions to reduce and manage stormwater runoff and flooding, including from more intense storm and flooding events and reduce localized flooding from surcharging, adapt to climate change, and manage stormwater runoff; and

WHEREAS, Green Streets improve water quality by filtering stormwater, removing contaminants and cooling the stormwater before it encounters groundwater or surface water bodies, such as rivers, all of which ultimately benefit watershed health. Facilities that filter stormwater through vegetation and soil can reduce total suspended solids (TSS), organic pollutants /oils, and heavy metals by at least 90%; and

WHEREAS, Green Streets foster unique and attractive streetscapes that protect and enhance neighborhood livability, integrate the built and natural environments, enhance the pedestrian environment, and introduce park-like elements into neighborhoods; and

WHEREAS, Green Streets can serve as urban greenways or pathways and provide a preferred means of connecting neighborhoods and parks/recreation areas in ways that are attractive to pedestrians and bikers and complement complete streets; and



WHEREAS, Green Streets encourage the planting of landscapes and trees which contribute environmental benefits such as reduced summer air temperatures, reductions in global warming through carbon sequestration and air pollution screening.

WHEREAS, green infrastructure may help to reduce the long-term costs of gray infrastructure maintenance, and complement gray infrastructure with hybrid systems of gray, piped infrastructure combined with green, vegetated infrastructure; and

WHEREAS, a Green Streets and Infrastructure policy demonstrates the City's commitment to achieving comparable infrastructure required for private developments and complements the City's complete streets policy by providing pedestrian and bicycle access; and

WHEREAS, forthcoming U.S. Environmental Protection Agency Municipal Separate Storm Sewer System (MS4) stormwater permits will require that the city control the amount and quality of stormwater discharged from the MS4s to rivers, streams, lakes, ponds, and wetlands; and

WHEREAS, recharge of groundwater sources is a key mitigation activity under the soon to be amended Massachusetts Water Management Act regulations 310 CMR 36.00; and

## DEFINITIONS:

- » **Green Infrastructure:** Infrastructure which keeps rain close to where it falls, using structures to improve on-site infiltration, such as rain gardens, green roofs and permeable pavements, to promote cleaner, slower, and smaller storm flows to nearby rivers and streams;
- » **Green Street:** A subset of Green Infrastructure in which the street handles significant amounts of stormwater on site through use of vegetated and/or soil-infiltration facilities. Green Streets can include landscaped street-side planters or swales or tree box filters or porous pavement that capture stormwater runoff and allow it to soak into the ground as soil and vegetation filter pollutants.

## RESOLUTION

Now, **THEREFORE, IT IS HEREBY RESOLVED** that the City of Northampton adopts a policy to promote the use of green street facilities and green infrastructure in public and private development through regulation, capital investment, and management mechanisms as a cost-effective and sustainable practice for stormwater management in current and future projects wherever technically and economically feasible. This includes:

- » Road reconstruction, new road development and bicycle or pedestrian projects;
- » Stormwater projects; and
- » New development and redevelopment projects

Further, it is city policy to:

- » Incorporate and maintain green street facilities and green infrastructure into all City-funded development, redevelopment, and enhancement projects, to the extent technically and economically feasible, and utilizing the best technology available at the time to meet water quality goals with the lowest lifecycle costs; and
- » Ensure that regulations require and incentivize all development to incorporate some Green Streets and green infrastructure features; and
- » Ensure coordination and communication between City departments, in particular, Public Works and Planning and Sustainability, to ensure implementation of this policy, as well as fully addressing competing priorities.

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Catalyst for Regional Progress

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PIONEER VALLEY  
SUSTAINABILITY TOOLKIT

# Model Sewer Regulations For Downspout Disconnection

REGULATIONS GOVERNING THE USE OF SANITARY AND  
COMBINED SEWERS AND STORM DRAINS OF THE BOSTON  
WATER AND SEWER COMMISSION

Adopted February 27, 1998

## Section 4 - Wastewater-Stormwater Separation.

(a) The plumbing of any existing or new building shall be so constructed as to keep all stormwater, surface water, groundwater, roof and surface runoff, subsurface drainage, uncontaminated cooling water, and uncontaminated industrial process water, non-contact cooling water, and non-contact industrial process water separate from sanitary sewage and industrial wastes, and from the building sewer.

(b) The building drain conveying wastewater from plumbing fixtures within the building shall discharge to a building sewer, while the building drain conveying stormwater and other drainage shall discharge to a building storm drain.

(c) Where separate storm drains and sanitary sewers are provided, and the Commission has determined that on-site retainage of stormwater is not possible, building storm drains shall be connected to a storm drain. Connection of a building storm drain to a sanitary sewer is prohibited.

(d) Where separate storm drains and sanitary sewers are provided, building sewers shall be connected to a sanitary sewer. Connection of a building sewer to a storm drain is prohibited.

(e) Where only a combined sewer has been provided, and the Commission has determined that on-site retainage of stormwater is not possible, the separate building storm drain shall be connected to the building sewer in a manner prescribed by the Commission's

Requirements for Site Plans and the building sewer connection shall be made to such combined sewer.

(f) The Commission shall require an owner to eliminate a source of infiltration or inflow whenever the Commission determines that the source is resulting in excessive infiltration or inflow to be discharged directly or indirectly to the sanitary sewer system.

### **Section 5 - Connections to Combined Sewers.**

In order to prevent the direct discharge of wastewater to receiving waters under dry weather conditions, a building sewer shall not be connected to a combined sewer overflow.

### **Section 6 - Connections to Manholes.**

Building sewer connections for new or substantially rehabilitated buildings shall not be made directly to Commission-owned manholes unless expressly authorized in writing by the Commission.

### **Section 7 - Connections to Catch Basins.**

Private drains, including but not limited to, building storm drains for new or existing buildings and drains from irrigation systems, shall not be connected directly to catch basins.

### **Section 8 - Connections from Individual Wastewater Disposal Systems.**

Connection of an individual wastewater disposal system, whether directly or indirectly, to a Commission sewer or drain is prohibited.

### **Section 7 - Connections to Catch Basins.**

Private drains, including but not limited to, building storm drains for new or existing buildings and drains from irrigation systems, shall not be connected directly to catch basins.

### **Section 8 - Connections from Individual Wastewater Disposal Systems.**

Connection of an individual wastewater disposal system, whether directly or indirectly, to a Commission sewer or drain is prohibited.

### **Section 9 - Dye Testing of Connections.**

Prior to activating water service, every new building sewer shall be dye tested by the Commission, or by the owner or his designee in the presence of a Commission inspector, to establish that the building sewer is properly connected to the Commission's wastewater system. The Commission may conduct dye testing of an existing building sewer to establish that it is properly connected to the Commission's wastewater system. The

Commission may require the owner forthwith to eliminate a connection from a building sewer to a storm drain (also referred to as an illegal connection) at the owner's expense. Where separate sanitary sewers and storm drains exist, the Commission may also dye test, or require the owner to dye test in the presence of a Commission inspector, a new or existing building storm drain to establish that the building storm drain is properly connected to the Commission's storm drainage system. The Commission may also require the owner forthwith to eliminate a connection from a building storm drain to a sanitary sewer at the owner's expense.

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