Weston & Sampson℠

westonandsampson.com

55 Walkers Brook Drive, Suite 100
Reading, MA 01867
tel: 978.532.1900

STORMWATER MANAGEMENT PLAN

MS4 GENERAL PERMIT COMPLIANCE

JUNE 2019

DEVENS MASSACHUSETTS

Devens
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 John P. Marc-Aurele

Signature John P. Marc-Aurele Date 6/30/19

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. 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. At that time, the Devens REGIONAL Enterprise Zone (hereafter, referred to as "Devens") was not considered to be a regulated area based on the 2000 Census data and was therefore not required to submit a Notice of Intent (NOI) to apply for coverage under this General Permit.

The 2003 NPDES Phase 2 MS4 General Permit (2003 MS4 Permit) required regulated communities 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.

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 4th, 2016 and became effective on July 1, 2018. Based on the 2010 census data, and due to the amount of development that has occurred in Devens since 2000, a majority of Devens has now been designated as urbanized area, and therefore Devens is subject to the requirements of the 2016 MS4 Permit. Appendix B of this report provides maps of the Phase II stormwater "permit compliance area" for Devens as determined by the USEPA using the latest decennial census. Urbanized area within the Devens Regional Enterprise Zone is displayed on regulated area maps available for the Towns of Shirley, Harvard, and Ayer.

A copy of the 2016 MS4 Permit is included in Appendix C. On March 22, 2018, Devens submitted a Notice of Intent (NOI) to EPA to obtain coverage under the 2016 MS4 Permit. An amendment was later filed on June 29, 2018 to amend the original NOI submission. A copy of the original Notice of Intent, including the Amendment, is included in Appendix D. EPA posted Devens' Notice of Intent for public comment on October 5, 2018 for a 30-day period. Devens received authorization from EPA to discharge under the 2016 MS4 Permit on March 6, 2019. A copy of Devens' Authorization to Discharge is included in Appendix D.

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. This plan will incorporate any existing practices, policies, and guidelines and expand their reach to encompass the goals of the 2016 MS4 Permit all while providing a framework for stormwater management at Devens to ensure that stormwater is managed and treated to the maximum extent possible. The stormwater management approach at Devens is grounded in the following goals: to advance stormwater management, exceed regulatory requirements, and to serve as an example community demonstrating through actions that new approaches and techniques to stormwater management can be implemented to support continued growth while improving receiving water quality.

The plan outlines a program of best management practices (BMPs) and measurable goals for the following six minimum control measures as identified in the 2016 MS4 Permit.

- 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

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

1.2 Governance and Structure

In 1996, the US Army post, which resided at Devens, officially closed. At that time, the land was distributed among various federal and state entities, with the Massachusetts Development Finance Agency acquiring the largest share. A comprehensive disposition process has been occurring since 2003 to determine the future governance of Devens, which includes creation of a new independent town

although this resolution has yet to receive the needed approval from all those stakeholders involved. The Devens Enterprise Commission (DEC) acts as the regulatory and permitting authority for the Devens Regional Enterprise Zone (Devens) administering and enforcing all bylaws and regulations. It essentially operates as Board of Health, Conservation Commission, Zoning Board of Appeals, Historic District Commission and Planning Board. There are twelve DEC Commissioners, all of whom are appointed by the Governor.

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
John Marc-Aurele, PE	Director of Engineering	MassDevelopment
David Blazon	Director of Public Works	MassDevelopment
Joseph Bisceglia	Project Engineer	MassDevelopment
Neil Angus	Environmental Planner	Devens Enterprise Commission
Peter Lowitt	Director/Land Use Administrator	Devens Enterprise Commission

1.3 Demographic Information

Devens is located in both Middlesex and Worcester Counties. It spans 6.8 square miles (17.7 square kilometers) in which only 0.08 square miles (1.2%) of Devens is water. As of the 2010 census, the population was 1,840 people.

Devens is comprised of predominantly urbanized area, based on the 2010 census data, and includes parts of Ayer, Harvard and Shirley.

Climate within the boundaries of Devens ranges from January average minimum temperature of 15 degrees Fahrenheit (°F) to July Average Maximum temperature of 84°F. The average annual precipitation of 47.9 inches, distributed throughout the year. The rainiest month is October, with approximately 4.4 inches of rain.

1.4 Water Resources

Devens is located within the boundaries of the Nashua River Watershed. Eight miles of rivers and streams flow through Devens, including the main stem of the Nashua River. Other water resources include abundant aquifers, wetlands, and approximately 100 acres of open waters. In addition to its location in the Main Stem subbasin of the Nashua, Devens also lies in the Catacoonamug Brook and Bowers/Nonacoicus Brook subbasins. Robbins Pond, Grove Pond, Plow Shop Pond, and Willow Branch are some of the major waterbodies within these subbasins. Some water bodies are considered impaired

according to the Final 2014 303(d) list of Impaired Waters. All impairments and outfalls discharging to these water bodies are summarized in Table 1.2 below:

Table 1.2
RECEIVING WATERS AND IMPAIRMENTS

Waterbody	Impairment	Number of Outfalls Discharging to Receiving Water
Nashua River (Segment MA81-05) *(Class B Water)*	Aquatic Macroinvertebrate Bioassessments, Escherichia coli, Phosphorus (Total), Sediment Bioassays – Acute Toxicity Freshwater	13
Wetlands Area near the Nashua River	-	4
Wetlands Area off MacPherson Road	-	1
Unnamed Stream Tributary to Mirror Lake	Mercury in Fish Tissue	1
Unnamed Stream & Wetlands Near Rte. 2A	-	3
Outfalls to Detention Basins to Swales to Plow Shop Pond	Non-Native Aquatic Plants*, Aquatic Plants (Macrophytes), Arsenic, Chromium (total), Mercury in Fish Tissue, Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems), Sediment Bioassays - Chronic Toxicity Freshwater	7
Willow Branch	-	19
Wetlands Area Off Lake George Street	-	3
Bowers Brook	-	7
Cold Spring Brook	-	10
Unnamed Water Body Off Saratoga Street	-	2
Unnamed Stream Off Patton Street	-	1
Unnamed Stream/Wetlands area Off Queenstown Street	-	4
Unnamed Stream/Wetlands off Elm Road	-	3
Unnamed Stream off Spruce Street	-	7
Catacoonamug Brook (MA81-74)	Escherichia Coli	5
Trout Brook	-	1

*TMDL not required, non-pollutant.

1.5 Interconnections and Impairments

MassDevelopment has begun the process of identifying interconnections with neighboring MS4s Interconnections are those locations where Devens' MS4 discharges to a MS4 under another entity's jurisdiction. MassDevelopment will finish identifying these interconnections within five years of the permit effective date as required by the permit, and delineate the contributing catchment areas. They will also be summarized, along with any related impairments, in a table to be included in this section.

1.6 Endangered Species and Historic Properties Determination

The 2016 MS4 Permit requires Devens to 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). Devens must demonstrate that there is no critical habitat for any endangered species within its boundaries, and if such a habitat exists, that no best management practice shall interfere with that habitat. Devens must also certify that no discharge will affect a property that is listed or eligible for listing on the NRHP; that any such effects have written acknowledgements from the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (THPO), or other representative that such effects shall be mitigated; and written proof that any best management practices constructed under this permit will include measures to minimize harmful effects on these properties.

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

The Devens Historic District is a historic district roughly bounded by El Caney Street, Antietam Street, Sherman Avenue, MacArthur Avenue, and Buena Vista Street, and includes land area within the underlying towns of Ayer and Harvard. The district encompasses a portion of the former Fort Devens, and includes several historical buildings. It has been determined to be very unlikely that any disturbance due to installing BMPs in the future would impact any of the historic properties located in this district. Devens can certify eligibility under Criterion A under the Historic Properties Preservation Act because Devens is a new permittee that is not undertaking any activity involving subsurface land disturbance less than one acre. Prior to construction of any structural BMPs, Devens 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 Devens 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.

Devens 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 it can be 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, Devens 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. Devens does not have any direct discharges to surface drinking water supply sources or their tributaries.

GROTON

SHIRLEY

AYER

HARVARD

Nashua River

Robbins Pond

Mirror Lake

Little Mirror Lake

Shirley Hollow Pond

Old Millpond

N

Storm

- Manhole
- Catch Basin
- Dry Well
- Fitting
- Storm Oil Water
- Outfall
- Storm Main
- Infiltration Chamber
- Chamber
- Swale
- Head Wall
- Detention Pond

Basemap

- Roads
- Hydrologic Connection
- Marsh/Bog
- Wooded marsh
- Open Water
- Parcels
- Town Boundary
- Federal/State Property.
- Property within DREZ Owned by Town of Shirley
- Devens Regional Enterprise Zone Boundary (DREZ)

600 0 600

Scale In Feet

FIGURE 1

MASSACHUSETTS DEVELOPMENT FINANCE AGENCY MS4 COMPLIANCE

DEVENS DRAINAGE SYSTEM MAP

MARCH 2018 SCALE: NOTED

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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 Devens currently employs. As part of the requirements of the Notice of Intent submitted to EPA, as included in Appendix D, Devens 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, Devens will have up to 10 years to implement some of the permit requirements as indicated. Devens' progress with respect to implementation of these BMPs, and other stormwater related activities, will be summarized in annual reports submitted to EPA in accordance with the MS4 Permit. These reports will be included in Appendix I.

The BMPs selected for each minimum control measure are summarized and briefly described in this section. Specific details for each BMP including measurable goals, implementation dates and individuals responsible for implementation are stated in each of the respective sections for each control measure in this plan. The Devens Enterprise Commission (DEC) and/or representatives from MassDevelopment will be responsible for implementation of each of the BMPs for the six minimum control measures.

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

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

2.2 Permit Requirements and Implementation Timeframes

Based on the 2000 census, Devens was not considered an urbanized area and therefore was not regulated under the 2003 MS4 Permit. Although not required to apply for coverage under the 2003 MS4 Permit, Devens is already in compliance with many of the 2003 MS4 Permit requirements.

2.2.1 Public Education and Outreach

The public education and outreach minimum control measure requires Devens to make educational information available to the public and other stakeholders specified by the permit.

<u>Regulatory Requirement:</u>

Section 2.3.2 of the 2016 MS4 General Permit requires permittees to "implement an education program that includes educational goals based on stormwater issues of significance within the MS4 area. The ultimate objective of a public education program is to increase knowledge and change behavior of the public so that pollutants in stormwater are reduced."

Existing Practices:

Devens currently has a progressive public education program that is currently under the jurisdiction of MassDevelopment and the DEC. Both the "Devens Community" website maintained by MassDevelopment and the DEC website provide information to residents and businesses on 'Living Green" including how to reduce water use and reduce waste generated. Information is also available to developers on green infrastructure guidelines for construction projects. For operators of industrial facilities, information is provided on Best Management Practices for stormwater pollution prevention. MassDevelopment and the DEC also continue to work with the Nashua River Watershed Association on supporting the federal designation of the Nashua River as a Wild and Scenic River as authorized and signed into law, and the development and distribution of materials to educate the public on protecting and improving the water quality within the Nashua River. As a result, the Nashua River Watershed Association's Wild and Scenic River Study cites the DEC Rules and Regulations as best practices for stormwater management in numerous sections of the report.

In addition to all the work being performed by Devens at present, the 2016 MS4 Permit requires a few extra measures. Devens must now distribute two rounds of information within three years to the following relevant stakeholders:

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

In order to accomplish this, Devens will implement the following BMPs:

BMP: Brochures/Pamphlets
Description: Provide general stormwater educational pamphlets as well as topic specific pamphlets addressing lawn care, pet waste, etc.
Targeted Audiences: Residents
Responsible Department/Parties: MassDevelopment (Engineering)
Measurable Goals: Distribute 2 pamphlets per year to residents.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Brochures/Pamphlets
Description: Provide general stormwater educational pamphlets as well as topic specific pamphlets addressing lawn/grounds maintenance, use of salt/de-icing materials and other facility specific materials, etc.
Targeted Audiences: Businesses, Institutions, and Commercial Facilities
Responsible Department/Parties: Devens Enterprise Commission, MassDevelopment (Engineering)
Measurable Goals: Distribute 2 pamphlets per year to businesses, institutions, and commercial facilities.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Brochures/Pamphlets
Description: Distribute brochures to prospective developers and contractors providing general information on stormwater management and summary information on Devens Rules and Regulations.
Targeted Audiences: Developers/Contractors (construction)
Responsible Department/Parties: Devens Enterprise Commission, MassDevelopment (Engineering)
Measurable Goals: Distribute brochure throughout the permit term and maintain a list of all recipients.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Brochures/Pamphlets
Description: Distribute brochures to industrial facilities providing general information on stormwater management and summary information on Devens Rules and Regulations.
Targeted Audiences: Industrial Facilities
Responsible Department/Parties: Devens Enterprise Commission (DEC), MassDevelopment
Measurable Goals: Distribute brochure throughout the permit and maintain a list of all recipients.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Web Page
Description: Provide new/updated Devens website to provide public access to stormwater-related materials, documentation and procedures.
Targeted Audiences: Residents
Responsible Department/Parties: MassDevelopment (Operations/Engineering)
Measurable Goals: Update the website during Permit Year 1 and track the interaction with the site through the duration of the permit term.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Web Page
Description: Provide new/updated Devens website and update Devens Enterprise Commission website to provide public access to stormwater-related materials, documentation, regulations and procedures.
Targeted Audiences: Businesses, Institutions and Commercial Facilities
Responsible Department/Parties: MassDevelopment (Operations/Engineering)/Devens Enterprise Commission
Measurable Goals: Update the website during Permit Year 1 and track the interaction with the site through the duration of the permit term.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Web Page
Description: Provide new/updated Devens website and update Devens Enterprise Commission website to provide public access to stormwater-related materials, documentation, regulations and procedures.
Targeted Audiences: Developers (Construction)
Responsible Department/Parties: MassDevelopment (Operations/Engineering)/Devens Enterprise Commission
Measurable Goals: Update the website during Permit Year 1 and track the interaction with the site through the duration of the permit term.

Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Web Page
Description: Provide new/updated Devens website and update Devens Enterprise Commission website to provide public access to stormwater-related materials, documentation, regulations and procedures.
Targeted Audiences: Industrial Facilities
Responsible Department/Parties: MassDevelopment (Operations/Engineering)/Devens Enterprise Commission
Measurable Goals: Update the website during Permit Year 1 and track the interaction with the site through the duration of the permit term.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: School Curricula/Programs
Description: Develop/distribute stormwater-related educational materials, posters, etc., to local schools for use in classrooms and for general use.
Targeted Audiences: Students
Responsible Department/Parties: MassDevelopment Operations/Engineering
Measurable Goals: Distribute materials to local schools annually.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Meeting
Description: Meet with businesses and institutions to review facilities and discuss specific discharge conditions.
Targeted Audiences: Businesses, Institutions, Commercial Facilities
Responsible Department/Parties: MassDevelopment Engineering/DPW, Devens Enterprise Commission
Measurable Goals: Meet with local businesses and institutions annually and tailor discussions to site specific stormwater information. A list of all facilities that have participated in the meetings shall be kept.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Meetings and Public Education Materials
Description: Continue to meet and work with the Nashua River Watershed Association to develop and distribute materials to educate the public on protecting the water quality of the Nashua River.
Targeted Audiences: General Public
Responsible Department/Parties: MassDevelopment Engineering, Devens Enterprise Commission
Measurable Goals: Meet and collaborate with the Nashua River Watershed Association annually to educate the general public.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Presentation
Description: Conduct a presentation on Stormwater Operation & Maintenance Plan Requirements.
Targeted Audiences: Businesses, Institutions, and Commercial Facilities
Responsible Department/Parties: MassDevelopment Engineering, Devens Enterprise Commission
Measurable Goals: Make a presentation annually and track the number of commercial entities that attend the presentation.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Web Page
Description: Continue to provide information to residents via the MassDevelopment "Devens Community" website and the Devens Enterprise Commission website on "Living Green" including how to reduce water use and reduce waste generated.
Targeted Audiences: Residents
Responsible Department/Parties: MassDevelopment, Devens Enterprise Commission
Measurable Goals: Send link to website where information is posted to residents and track number of residents contacted and the number of visits to the website.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Web Page
Description: Continue to provide information to residents via the MassDevelopment "Devens Community" website and the Devens Enterprise Commission website on "Living Green" including how to reduce water use and reduce waste generated.
Targeted Audiences: Businesses, Institutions and Commercial Facilities
Responsible Department/Parties: MassDevelopment, Devens Enterprise Commission
Measurable Goals: Send link to website where information is posted to local businesses and track number of businesses contacted and the number of visits to the website.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Brochures/Pamphlets
Description: Continue to make information available to developers on green infrastructure guidelines for construction projects in Devens.
Targeted Audiences: Developers (Construction)
Responsible Department/Parties: MassDevelopment, Devens Enterprise Commission
Measurable Goals: Post information on the Devens Enterprise Commission website and handout information to developers as new development projects are introduced to the Commission - keep a list of developers to which the information is distributed.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Web Page
Description: Continue to make available to operators of industrial facilities information on Best Management Practices focused on stormwater pollution prevention
Targeted Audiences: Industrial Facilities
Responsible Department/Parties: MassDevelopment, Devens Enterprise Commission
Measurable Goals: Post information on the Devens Enterprise Commission website and e-mail a link to the information to owners/operators of industrial facilities within Devens. Track the number of owners/operators e-mailed and the number of visits to the website.
Implementation Timeframe: To be implemented during Permit Year 1 (FY2019) and continued for the duration of the permit.

Public education materials utilized for MS4 Compliance are included in Appendix F.

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 Practices:

MassDevelopment and the Devens Enterprise Commission continue to work with the Nashua River Watershed Association. The Nashua River Watershed Association holds meetings annually with communities located in the watershed. They also hold informational sessions and assist communities in implementing low impact development and green infrastructure practices. Devens is also an active participant in the Devens Household Hazardous Products Collection Program.

In addition to continuing the above practices, Devens plans to implement the following BMPs to meet the public involvement and participation requirements of the permit, and engage the public in the implementation of the SWMP.

BMP: Public Review
Description: Provide for Public Review of Stormwater Management Plan and Annual Reports
Responsible Department/Parties: MassDevelopment (Engineering), Devens Enterprise Commission
Measurable Goals: Make SWMP and annual reports available to public at MassDevelopment Offices & on Devens website.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Public Participation
Description: Provide Public Opportunity to Participate in SWMP Development
Responsible Department/Parties: MassDevelopment (Engineering), Devens Enterprise Commission
Measurable Goals: Allow public to comment on stormwater management plan annually.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Public Participation
Description: Continue to provide public access to Recycling Drop-Off
Responsible Department/Parties: MassDevelopment (DPW)
Measurable Goals: Continue to provide public access to the recycling drop off at the DPW facility annually.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Public Participation
Description: Continue public access to Regional Household Hazardous Waste Collection Center
Responsible Department/Parties: MassDevelopment
Measurable Goals: Continue participation in Devens Regional Household Hazardous Products Collection Center.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Public Participation
Description: Continue participation in the Nashua River Watershed Association
Responsible Department/Parties: Devens Enterprise Commission, MassDevelopment
Measurable Goals: Attend or participate in at least one meeting or event annually of the Nashua River Watershed Association.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Public Participation
Description: Provide community access to clean-up days, tree plantings, etc.
Responsible Department/Parties: Devens Enterprise Commission, MassDevelopment
Measurable Goals: Sponsor one activity annually for public involvement.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

BMP: Public Participation
Description: Continue participation in the Devens Eco-Efficiency Center
Responsible Department/Parties: Devens Enterprise Commission (DEC)
Measurable Goals: Provide at least one program/service annually to assist local businesses in reducing the amount of waste they generate and disposal costs.
Implementation Timeframe: To be completed during Permit Year 1 (FY2019) and continued for the duration of the permit.

2.2.3 Illicit Discharge Detection and Elimination

Regulatory Requirement:

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

Existing Practices:

Devens already has a comprehensive GIS map of their drainage system, which needs only minor updating to be fully compliant with the mapping requirements of the 2016 MS4 Permit. Devens will continue to further develop their drainage mapping under the permit by identifying interconnections, or those locations where Devens's MS4 discharges to a neighboring MS4's jurisdiction, and delineating tributary catchment areas for all outfalls and interconnections. Devens already has identified drainage infrastructure located within the Devens Regional Enterprise Zone that is under the jurisdiction of other federal, state and municipal entities.

As a new permittee not previously covered under the 2003 MS4 Permit, Devens must establish legal authority to prohibit illicit discharges, investigate suspected illicit discharges, eliminate illicit discharges, and implement enforcement procedures through adoption of a new or modification of an existing regulatory mechanism. Devens must also develop a written IDDE plan, continue to maintain an inventory of all known Sanitary System Overflows (SSOs) and begin implementation of their illicit discharge detection and elimination program, including dry and wet weather outfall screening and sampling. These permit requirements can be achieved by implementing the following BMPs:

BMP: Illicit Discharge Detection and Elimination Regulations
Description: Review existing regulatory prohibitions and update as needed to provide required legal authority to prohibit, investigate, and eliminate illicit discharges. The general provisions of 974 CMR 4.08(2) currently require all projects to comply with MA DEP Stormwater Management Standards and submit a completed and endorsed stormwater management form which includes a signed Illicit Discharge Compliance Statement verifying that no illicit discharges exist on the site. Failure to prevent illicit discharges constitutes a violation of the Unified Permits issued for development at Devens and is subject to enforcement procedures outlined in 974 CMR 1.14.
Responsible Department/Parties: MassDevelopment (Engineering and Utilities)
Measurable Goals: Review existing authority and prohibitions. Amend existing Devens regulations for enforcement as needed. Report on progress in Annual Reports.
Implementation Timeframe: To be completed within three years of the permit effective date, but begin review during Permit Year 1 (Start FY2019, Complete FY2021).

BMP: SSO Inventory
Description: Develop inventory of where Sanitary Sewer Overflows (SSOs) have discharged in the five years prior to the permit effective date and since the permit became effective.
Responsible Department/Parties: MassDevelopment (Utilities), Devens Enterprise Commission (BOH)
Measurable Goals: Continue to maintain and update existing SSO inventory annually and provide updates in annual MS4 reports.
Implementation Timeframe: To be completed within 1 year of the permit effective date (FY2019).

BMP: Storm Sewer System Map
Description: Review and update existing drainage map to include catchment delineations, interconnections, and impaired waters. Update annually thereafter to incorporate drainage improvements, including drainage from new developments and re-developments, and findings during IDDE Program Implementation.
Responsible Department/Parties: MassDevelopment (Engineering)
Measurable Goals: Update Devens' existing drainage map to include the following within 2 years of the permit effective date:

- all outfalls and receiving waters*),*
- open channel conveyances,
- interconnections with other MS4s*)*,
- municipally-owned stormwater treatment structures,
- impaired waterbodies*, and*
- initial catchment delineations.

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

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

In addition, EPA suggests adding, but does not require, the following information, some of which Devens 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: Complete initial mapping updates within 3 years of the permit effective date and complete full system map within 13 years of permit effective date (Start FY2021, Complete FY2031).

BMP: Written IDDE Program
Description: Create written IDDE plan to meet permit conditions
Responsible Department/Parties: MassDevelopment (Engineering/DPW Operations)
Measurable Goals: Develop written IDDE plan and follow the guidelines and practices in the program in implementation of the illicit discharge detection and elimination investigation program.
Implementation Timeframe: To be completed within four years of the permit effective date, but begin development during Permit Year 3 (Start FY2021, Complete FY2022).

BMP: Outfall and Interconnection Inventory
Description: All outfalls and interconnections have been mapped. Update outfall and interconnection inventory as needed to incorporate condition information.
Responsible Department/Parties: MassDevelopment (Engineering/DPW Operations)
Measurable Goals: Review existing GIS and update inventory as needed
Implementation Timeframe: To be completed within four years of the permit effective date (FY2022).

BMP: Priority Ranking
Description: Assess and rank the potential for all catchments to have illicit discharges.
Responsible Department/Parties: MassDevelopment (Engineering/DPW Operations)
Measurable Goals: Devens 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, Devens 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: To be completed within four years of the permit effective date, but begin during Permit Year 1 (Start FY2019, Complete FY2022).

BMP: Conduct Dry Weather Screening
Description: Conduct Dry Weather Screening in accordance with outfall screening procedure and permit conditions.
Responsible Department/Parties: MassDevelopment (Engineering, DPW Operations)
Measurable Goals: Complete all dry weather screening and sampling within 6 years of the permit effective. Track number of outfalls that are screened annually.
Implementation Timeframe: To be completed within six years of the permit effective date, but begin during Permit Year 4 (Start FY2022, Complete FY2024).

BMP: Follow-up Ranking
Description: Update catchment prioritization and ranking as additional dry weather screening information becomes available.
Responsible Department/Parties: MassDevelopment (Engineering, DPW Operations)
Measurable Goals: The outfall ranking described above shall be amended by Devens as dry weather and sampling information becomes available.
Implementation Timeframe: To be completed within six years of the permit effective date, but begin during Permit Year 4 (Start FY2022, Complete FY2024).

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: MassDevelopment (Engineering, DPW, Operations)
Measurable Goals: Complete all wet weather screening and sampling within 13 years of permit effective date. Track number of outfalls that are screened and sampled annually.
Implementation Timeframe: Begin after results from dry weather screening are obtained and before IDDE Investigations are complete within 13 years of the permit effective date (Start FY2023, Complete FY2031).

BMP: Employee Training
Description: Train employees on IDDE implementation.
Responsible Department/Parties: MassDevelopment (Engineering, DPW Operations)
Measurable Goals: Complete annual training in accordance with the IDDE plan developed. Track the number of employees that receive training.
Implementation Timeframe: Begin after IDDE plan is written and continue annually for duration of permit (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: MassDevelopment (Engineering, DPW Operations)
Measurable Goals: Implement and enforce practices set forth in written IDDE plan and IDDE regulations. Track the number of illicit connections that are identified and removed annually.
Implementation Timeframe: Begin after IDDE plan is written, at most 5 years after the permit effective date and complete 13 years after the permit effective date (Start FY2023, Complete FY2031).

BMP: Ongoing Screening
Description: Conduct Dry and Wet weather screening (as necessary).
Responsible Department/Parties: MassDevelopment (Engineering, DPW, Operations)
Measurable Goals: Complete ongoing outfall screening upon completion of IDDE program in year 13 after the permit effective date.
Implementation Timeframe: To begin after completion of IDDE investigations as needed (FY2031).

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 Practices:

Under the Massachusetts Code of Regulations (974 CMR 1.00 – 10.00), The Devens Enterprise Commission (DEC) has promulgated regulations that address stormwater management controls, and erosion and sediment controls for new development and re-development. The DEC has existing Green Infrastructure Guidelines for new development and re-development which require adherence to the

following sections of the Massachusetts Code of Regulations: 4.09 – Water Resource Protection, 4.11 – Greenhouse Gas Mitigation, 4.07 – Earth Removal, 3.04(4) – Stormwater Management, 3.02(3)(e) – Erosion and Sedimentation Controls During Construction, and 3.06 – Steep Slope Protection.

Devens also currently has zoning bylaws that require site-specific sediment and erosion control plans and development of a stormwater pollution prevention plan. This is included in the level one and level two permits, which should cover all new and re-development that disturbs more than one acre of land. In addition, the DEC has Rules and Regulations which include their own enforceable system for granting permits, subdivision laws, and site plan regulations.

To attain compliance with the 2016 MS4 Permit, Devens will implement the following BMPs to supplement the guidelines set forth in their zoning bylaws and rules and regulations.

BMP: Construction Site Stormwater Runoff Control (ESC) Regulations
Description: Continue compliance with Devens Enterprise Commission regulatory requirements for Erosion & Sediment Control (ESC) Plan under 974 CMR 3.02(3)(e).
Responsible Department/Parties: Devens Enterprise Commission, MassDevelopment
Measurable Goals: Continue to enforce the ESC measures and report on the number of site inspections and trainings that occur annually in the annual reports.
Implementation Timeframe: Continue to enforce throughout the permit term (FY2019).

BMP: Site Inspection and Enforcement of Erosion and Sediment Control (ESC) measures
Description: Continue implementation of 974 CMR 3.02(3)(e) and conditions of all site development approvals that require an ESC plan and DEC inspection of all controls prior to commencement of construction. Standard conditions of approval also require Applicant maintain an ESC log for all controls that is to be made available for inspection by DEC. Document existing inspection procedures.
Responsible Department/Parties: Devens Enterprise Commission (DEC), MassDevelopment
Measurable Goals: Continue existing site inspection and enforcement procedures. Document inspection and enforcement procedures. Procedures must be in written format within three years of permit effective date or by July 2021.
Implementation Timeframe: Continue to enforce throughout the permit term and document existing procedures within three years of the permit effective date (FY2021).

BMP: Site Plan Review
Description: Continue compliance with DEC regulatory requirements for ESC plan under 974 CMR 3.02(3)(e), protection of steep slopes 974 CMR 3.06, earth removal 974 CMR 4.07 and stormwater management 974 CMR 4.08. Document existing site plan review procedures.
Responsible Department/Parties: Devens Enterprise Commission, Engineering
Measurable Goals: Continue existing site plan review procedures. Document existing site plan review procedures. Procedures must be in written format within three years of permit effective date or by July 2021.
Implementation Timeframe: Continue to enforce throughout the permit term and create a written set of procedures within three years of the permit effective permit date (FY2021).

BMP: Erosion and Sediment Control
Description: Continue compliance with DEC regulatory requirements for ESC Plan under 974 CMR 3.02(3)(e) and 974 CMR 3.06.
Responsible Department/Parties: Devens Enterprise Commission, MassDevelopment

Measurable Goals: Continue compliance with existing requirements for erosion and sediment control at construction sites. Ensure BMPs are appropriate for site conditions.
Implementation Timeframe: Continue to enforce throughout permit term (FY2019).

BMP: Waste Control
Description: Continue requiring waste disposal and recycling affidavits as part of building permit process: http://www.devensec.com/forms/Building_Permit_2016.pdf (see page 2). DEC Determination of Completeness requirements also require applicants to identify waste disposal methods as part of site plan review (recycling, composting, reuse): http://www.devensec.com/forms/DOC_Form_2012.pdf (see page 3).
Responsible Department/Parties: Devens Enterprise Commission, MassDevelopment
Measurable Goals: Continue to require compliance with existing requirements for waste control.
Implementation Timeframe: Continue to enforce throughout the permit term (FY2019).

2.2.5 Post-Construction Stormwater Management

Regulatory Requirement:

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

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

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

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

Existing Practices:

Devens has incorporated post construction stormwater management control measures in the DEC Development Rules and Regulations promulgated in 1996 and last revised in 2013, the Devens By-Laws promulgated in 1994 and last revised in 2015, and the Devens Stormwater Pollution Prevention Plan promulgated in 1995. Since 1997, these regulations have required all stormwater management systems to be designed with pre-development areas modeled as "green field", requiring developments to pre-treat and infiltrate more runoff directly on-site than what would have been required for redevelopment projects under the Massachusetts Stormwater Management Standards. The DEC requires that all projects comply with the MADEP Stormwater Management Standards regardless of whether the project is subject to the Wetlands Protection Act. Since 2011, Devens has required Low Impact Development (LID) for all new and redevelopment projects. 974 CMR 4.08 includes requirements to promote the use of LID stormwater management techniques to the maximum extent feasible to mimic the predevelopment hydrology of the site. Since 2011, Devens has also developed comprehensive green infrastructure guidelines and regulatory requirements for large building projects, and updated its stormwater operations and maintenance plan requirements for all private development.

Devens shall continue to build on these existing practices and meet the requirements of the 2016 MS4 Permit through implementation of the following:

BMP: Post Construction Stormwater Management Regulations
Description: Continue to require compliance with Devens Enterprise Commission (DEC) regulatory requirements for post-construction runoff from new development and re-development as included in 974 CMR 4.08 and 4.09.
Responsible Department/Parties: Devens Enterprise Commission, MassDevelopment (Engineering, Operations)
Measurable Goals: Continue to enforce existing regulations.
Implementation Timeframe: Continue to enforce regulations throughout the permit term (FY2019).

BMP: Target Properties to Reduce Impervious Areas
Description: Identify and priority rank at least 5 permittee-owned properties that could be modified or retrofitted with BMPs to reduce impervious cover and update annually.
Responsible Department/Parties: Devens Enterprise Commission, MassDevelopment (Engineering, DPW Operations)
Measurable Goals: This goal can be achieved through disconnecting impervious surfaces, 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: Complete within 6 years of the permit effective date and report annually on retrofitted properties (FY2024).

BMP: Allow for Green Infrastructure
Description: Continue to require LID practices for all stormwater management projects where feasible: 974 CMR 3.04(4)(a)1. & 974 CMR 4.08. Continue to utilize and improve on green infrastructure guidelines to guide, regulate and incentivize green infrastructure on all development and redevelopment projects: http://www.devensec.com/development/Green_Infrastructure_Guidelines_Final_8-12-14.pdf . Continue to monitor impervious surface reductions in Devens Sustainable Indicators Reports.
Responsible Department/Parties: Devens Enterprise Commission (DEC)
Measurable Goals: Continue to require LID practices as well as monitor and track sustainable indicators including impervious surface reductions resulting from incorporation of LID.
Implementation Timeframe: Continue to enforce throughout the duration of the permit (FY2019).

BMP: Street Design and Parking Lot Guidelines
Description: Encourage the use of reduced pavement widths and variable street standards and types, shortened roads through cluster development and alternative surfaces such as porous pavement, pavers, or reinforced turf. 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. Continue to require LID practices for all street and permittee-owned parking lot projects where feasible: 974 CMR 3.04(4)(a)1. & 974 CMR 4.08. Continue to monitor impervious surface reductions in Devens Sustainable Indicators Reports.
Responsible Department/Parties: Devens Enterprise Commission, MassDevelopment (Engineering)
Measurable Goals: Continue to require LID practices as well as monitor and track sustainable indicators including impervious surface reductions resulting from incorporation of LID.

Implementation Timeframe: Continue to enforce and track throughout the duration of the permit (FY2019). Complete report within 6 years of the permit effective date and implement recommendations of report as warranted and where feasible.

BMP: Ensure the Requirements of the MA Stormwater Handbook are met
Description: Ensure any stormwater controls and management practices for new development and redevelopment meet the retention and treatment requirements of the MS4 Permit and all applicable requirements of the Massachusetts Stormwater Handbook. Review existing regulatory requirements and amend requirements as needed to meet permit conditions.
Responsible Department/Parties: Devens Enterprise Commission (DEC)
Measurable Goals: Modify existing regulatory mechanism to meet permit requirements.
Implementation Timeframe: Complete within 4 years of the permit effective date (FY2022).

BMP: As-Built Plans for Stormwater Control/Long-term Operation and Maintenance of BMPs
Description: Continue current procedures which require the development of O&M Plans as part of the permitting process and as a condition of occupancy. Continue to require property owners to file annual reports regarding system maintenance to the DEC. Continue to require the submission of as-builts prior to occupancy.
Responsible Department/Parties: Devens Enterprise Commission, MassDevelopment (Engineering)
Measurable Goals: Continue current procedures as they relate to development of O&M Plans and submission of as-built plans.
Implementation Timeframe: Continue to enforce throughout the duration of the permit (FY2019).

BMP: Inspection of Private Detention Basins
Description: Continue to require annual inspection of private detention basins to ensure compliance with existing O&M requirements. This inspection should be conducted by the owner/operator of the detention basin, and inspection reports should be submitted to the DEC and MassDevelopment.
Responsible Department/Parties: Devens Enterprise Commission (DEC), MassDevelopment (Engineering)
Measurable Goals: Continue to inspect annually to ensure compliance with existing O&M Plans. Report on the number of properties inspected annually and status of compliance.
Implementation Timeframe: Continue to enforce throughout the duration of the permit term (FY2019).

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 form all permittee-owned operations."

This minimum control measure includes a training component and has the ultimate goal of preventing or reducing stormwater pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and stormwater system maintenance.

Existing Practices:

The DPW's current procedures for maintaining existing infrastructure are based on computer generated tasks, programmed for specific equipment or duties for a specific time. Devens does

have a written O&M plan/schedule that covers street sweeping, catch basin cleaning, and maintenance of BMPs. Devens currently sweeps all public streets and municipal parking lots in the early spring, and then on average every 4 weeks, as needed. Devens cleans approximately 50% of catch basins per year. Catch basin cleanings and street sweepings are stock piled in a self-contained erosion-free area at the DPW Yard, which are then transported to a landfill.
To be in compliance with the 2016 permit, catch basins must be no more than 50% full at any one time. To achieve this, all structures must be cleaned, measured, logged and monitored to develop an optimization plan. Devens shall continue to build on these existing practices and meet the requirements of the 2016 MS4 Permit through implementation of the following:

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: MassDevelopment (Engineering, DPW Operations)
Measurable Goals: Create Inventory and update annually.
Implementation Timeframe: Complete within 4 years of the permit effective date and update as needed (FY2022).

BMP: O&M Practices
Description: Review existing 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 vehicles and equipment. Modify as necessary to ensure compliance with Section 2.3.7.a(ii) of the 2016 MS4 Permit.
Responsible Department/Parties: MassDevelopment (Engineering, DPW Operations)
Measurable Goals: Review and update standard operation and maintenance procedures for all municipal activities and facilities as necessary.
Implementation Timeframe: Complete within 4 years of the permit effective date and update as needed (FY2022).

BMP: Infrastructure O&M
Description: Establish and implement a program for repair and rehabilitation of MS4 infrastructure.
Responsible Department/Parties: MassDevelopment (Engineering, DPW Operations)
Measurable Goals: Create and implement the operation and maintenance plan.
Implementation Timeframe: Complete within 4 years of the permit effective date and update as needed (FY2022).

BMP: Catch Basin Cleaning Optimization
Description: Continue current practice of inspecting all catch basins annually and quantifying the amount of sediment removed from each basin. Continue to utilize information collected to optimize existing cleaning practices.
Responsible Department/Parties: MassDevelopment (Engineering, DPW Operations)
Measurable Goals: Continue to track sediment removed and optimize catch basin cleaning operations. Complete optimization plan within 4 years of permit effective date.
Implementation Timeframe: Begin collected of data in Permit Year 1 and complete optimization within 4 years of the permit effective date and update as needed (Start FY2019, Complete FY2022).

BMP: Catch Basin Cleaning

Description: Continue to target areas where catch basins fill up with sediment more quickly to ensure that each catch basin is no more than 50% full. Modify cleaning schedule and frequency as needed.
Responsible Department/Parties: MassDevelopment (Engineering, DPW Operations)
Measurable Goals: Clean catch basins on established schedule and report number of catch basins cleaned and total volume of material removed annually.
Implementation Timeframe: Complete and implement with one year of the permit effective date (FY2019).

BMP: Street Sweeping Program
Description: Continue to sweep all streets and permittee-owned parking lots at least annually in accordance with permit conditions.
Responsible Department/Parties: MassDevelopment (Engineering, DPW Operations)
Measurable Goals: Sweep all streets and permittee-owned parking lots at least once per year in the spring and report.
Implementation Timeframe: Complete within 1 year of permit effective date and implement annually (FY2019).

BMP: Road Salt Use Optimization Program
Description: Continue to calibrate equipment annually. Continue to review and enhance existing practices to minimize the use of road salt.
Responsible Department/Parties: MassDevelopment (Engineering, DPW Operations)
Measurable Goals: Continue current efforts and modify existing practices where feasible for further optimization of road salt use. Complete optimization plan within 4 years of permit effective date.
Implementation Timeframe: Complete optimization plan within 4 years of permit effective date (FY2022).

BMP: Inspections and Maintenance of Stormwater Treatment Structures
Description: Continue to inspect detention ponds annually and clean as needed. Establish and implement inspection and maintenance procedures and frequencies for other stormwater treatment structures.
Responsible Department/Parties: Devens Enterprise Commission, MassDevelopment (Engineering, DPW Operations)
Measurable Goals: Review existing procedures and optimize. Inspect and maintain treatment structures at least annually. Begin annual inspections within 4 years of permit effective date.
Implementation Timeframe: Begin annual inspections within 4 years of permit effective date (FY2022).

BMP: Stormwater Pollution Prevention Plan (SWPPP)
Description: Create SWPPPs for waste-handling facilities not already covered under the Multi-Sector General Permit.
Responsible Department/Parties: MassDevelopment (Engineering, DPW Operations), Devens Enterprise Commission
Measurable Goals: Develop SWPPPs within 4 years of permit effective date and complete inspections and training annually thereafter.
Implementation Timeframe: Complete and implement within four years of permit effective date (FY2022).

3.0 REGULATORY STANDARDS

3.1 Introduction

In order to prevent pollutants from entering the drainage system and being discharged to the environment with stormwater, Devens plans to continue existing practices and implement 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 Devens' current regulatory mechanisms, as well as the status of compliance with the 2016 MS4 Permit regulatory requirements are included in this section.

3.2 Existing Stormwater Regulatory Mechanisms

3.2.1 Devens Enterprise Commission Development Rules and Regulations

Under the Massachusetts Code of Regulations (974 CMR 1.00 – 10.00), The Devens Enterprise Commission (DEC) has promulgated regulations that address stormwater management controls, and erosion and sediment controls for new development and re-development. The DEC Rules and Regulations were developed in August 1996 and most recently revised in November 2013. Outlined in these regulations is the process for reviewing submissions in Devens which is called Unified Permitting. The purpose of Unified Permitting, which is administered by the DEC, is to provide for expeditious permitting of land development to promote the orderly conversion and redevelopment of Devens. The major components of this system are zoning, site plan review and subdivision of land.

There are two levels of application review as part of the development permitting process. Level One is applicable to relatively simple submissions and Level Two is reserved for more complicated or higher impact submissions. An application for a Development Permit shall be deemed Level One in the following cases:

a. issuance of building or occupancy permit, wherein no other Commission action or site plan review is required;
b. issuance of a permit for alteration or creation of a lot for any of the following purposes: revision of lot lines, division of a lot containing two (2) buildings into two (2) lots with separate buildings, and division of a single lot unimproved by a building into two (2) or more smaller lots; provided, however, that in any event all resultant lots shall comply with the frontage requirements in Article VIII and said frontage shall be on a way which the Commission certifies is used and maintained as a public way;

c. approval of minor modifications to an already approved site plan consistent in scope with the following examples: a change to a more desirable variety of landscape material; a shift of less than eight (8) feet in building placement on the lot, for siting reasons; a shift in site utility connections, in order to provide improved hookup to the public system or to avoid a natural constraint; an adjustment of not more than three (3) feet in the width or location of a driveway entrance, in order to improve sight distance or to avoid a natural constraint; and similar adjustments required to facilitate a more functional site plan;
d. approval of minor architectural modifications of a structure within an historic district;
e. issuance of a certificate of compliance under an order of conditions.

An application for a Development Permit shall be deemed Level Two in all other circumstances.

974 CMR 4.08 presents the Stormwater Management requirements in the Industrial Performance Standards. Since 1997, these regulations have required all project stormwater management systems to be designed with pre-development areas all being modeled as "green field", requiring developments to pre-treat and infiltrate more runoff directly on-site than what would have been required for redevelopment projects under the Massachusetts Stormwater Management Standards. 974 CMR 4.08 also includes requirements to promote the use of Low Impact Development (LID) stormwater management techniques to the maximum extent feasible to mimic the predevelopment hydrology of the site. The existing Green Infrastructure Guidelines encompass 974 CMR Sections 3.04(4) – Stormwater Management, 3.02(3)(e) – E&S Controls, and 3.06 – Steep Slope Protection, all of which outline necessary controls to regulate the quality of water entering the MS4.

3.2.2 Zoning Bylaws of the Devens Regional Enterprise Zone

The Zoning Bylaws of the Devens Regional Enterprise Zone, which govern land development in Devens, were adopted on November 14, 1994 and last revised in July 2015. They identify when site plan review is triggered as a part of or as a sole component of a Level Two Development Permit application, which includes:

(i) construction of any new building, regardless of land use;

(ii) extension or increase in the area of a nonconforming use in an existing building;

(iii) construction or expansion of a parking lot, structure, or loading dock;

(iv) construction of an ancillary building on-site (denoting use for storage of equipment, maintenance supplies, and similar items, or housing building systems equipment), if the building contains more than eight hundred (800) square feet of gross floor area; and/or

(v) construction of a project that will result in changes to the existing grade of ten (10) percent or more of the lot size.

Devens Zoning Bylaws require that applications for development permits include a site-specific sediment and erosion control plan, and a stormwater pollution prevention plan.

3.2.3 Stormwater Pollution Prevention Plan

In 1995, Devens created a Stormwater Pollution Protection Plan to foster responsible stormwater management and further protect water resources in Devens. The Stormwater Pollution Prevention is utilized as a guide for the Devens Enterprise Commission, for site developers and site occupants at Devens to preserve natural resources by following and implementing proper stormwater management procedures.

3.2.4 Water Resource Protection Report

The protection of water resources in the Devens region has been a priority since the base closure in 1993, one which has been emphasized throughout the planning and redevelopment process at Devens. In 1994, as part of the Devens Reuse planning process, a Water Resource Protection Report was created to identify and protect the ground and surface water resources while allowing redevelopment. This led to the development of a Water Resources Protection Overlay Zone in the Devens Bylaws and DEC Rules and Regulations (974 CMR 4.09 – Water Resource Protection). Incorporating water resource protection efforts early on in the redevelopment process has allowed Devens to steer development away from wetlands, floodplains, and other sensitive resource areas to both protect and improve surface and groundwater resources.

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

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

3.3.1 Illicit Discharge Detection and Elimination

Permit Requirement: The 2016 MS4 Permit requires the Devens Enterprise Commission to prohibit non-stormwater discharges into the MS4 and implement enforcement procedures within three years of the permit effective date. A regulatory mechanism must be implemented to provide the DEC with adequate legal authority to accomplish the following tasks:

- 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.

Excerpts from Devens' Regulations that Support Permit Requirement: The general provisions of 974 CMR 4.08(2) currently require all projects to comply with MA DEP Stormwater Management Standards and submit a completed and endorsed stormwater management form which includes a signed Illicit Discharge Compliance Statement verifying that no illicit discharges exist on the site. Failure to prevent illicit discharges constitutes a violation of the Unified Permits issued for development at Devens and is subject to enforcement procedures outlined in 974 CMR 1.14.

The Devens Enterprise Commission will need to supplement these regulations to provide the DEC with adequate legal authority to prohibit illicit discharges associated with existing development, to investigate suspected illicit discharges, to eliminate illicit discharges from private property; and implement enforcement procedures.

3.3.2 Construction Site Stormwater Runoff Control

The 2016 MS4 Permit requires the following:

Regulate Construction Runoff from Properties Disturbing Greater than One Acre

Permit Requirement: Devens is required to develop, implement and enforce a program to address stormwater runoff from construction activities that disturb greater than one acre and discharge into the MS4. The program shall also 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, Devens is required to develop an ordinance or other regulatory mechanism to address construction runoff from properties that disturb greater than one acre and discharge to the MS4 by requiring the use of sediment and erosion control practices at construction sites. This regulatory mechanism is required to be developed within three years of the permit effective date.

Excerpts from Devens' Regulations that Support Permit Requirement: Per 974 CMR 2.04(1)(r), Level Two Definitive Subdivision Plans require a Stormwater Pollution Prevention Plan including erosion, siltation, and dust control measures before and during construction, and appropriate ground cover, seeding, and sweeping of adjacent public ways. Under 974 CMR 3.02(2)(p), site plan submission requirements include submittal of "an erosion and sedimentation control plan as per 974 CMR 3.04(4) and the Devens Stormwater Pollution Prevention Plan." 974 CMR 3.02(3)(e) states that "All site plan submissions shall include an Erosion and Sediment Control Plan containing sufficient information to describe the nature and purpose of the proposed development, pertinent conditions of the site and the adjacent areas, and proposed erosion and sedimentation controls. The plan shall include such detail as is necessary to demonstrate that the proposed development will comply with Massachusetts Department of Environmental Protection Stormwater Management Standards, the Devens Stormwater Pollution Prevention Plan and 974 CMR 3.04 design standards. The Erosion and Sediment Control Plan shall also include the following:

- Location and description of Resource Areas…
- Existing soils and volume and nature of any imported materials
- Drainage patterns, watershed and sub-watersheds, with calculations of proposed land disturbance within each sub-watershed and areas of soil to be disturbed in each watershed throughout the duration of the proposed land disturbance activity.
- A description of construction and waste materials expected to be stored onsite. The Plan shall include a description and details of controls to reduce pollutants from these materials, including storage practices to minimize exposure of the materials to stormwater, and spill prevention response.
- Location and details of all erosion and sediment control measures with a narrative of the construction sequence/phasing of the project, including both Operation and Maintenance for structural and non-structural control measures and best management practices, interim grading, and material stockpiling areas in accordance with the Devens Stormwater Pollution Prevention Plan and Massachusetts Erosion and

Sediment Control Guidelines for Urban and Suburban Areas. Such narrative and Operation and Maintenance Plan for temporary and permanent erosion control measures during Construction, shall be included on the erosion and sediment control plan and include but not be limited to, the following requirements:

a. Prior to any land disturbance activities commencing on the site, the Applicant/contractor shall be responsible for physically marking the limits of construction on the site with tape, signs, or orange construction fence, so that workers understand the areas to be protected. The physical markers shall be inspected daily and repaired as necessary throughout the duration of the project.
b. Perimeter sediment control system shall be installed prior to soil disturbance and maintained to contain soils on-site. Areas outside of the perimeter sediment control system must not be disturbed unless the Applicant has obtained prior approval from the DEC.
c. Measures shall be taken to control erosion within the project area. Sediment in runoff water shall be trapped and retained within the project area and street sweeping of adjacent Streets and Roads shall be included where necessary.
d. All Resource Areas shall be protected from sediment.
e. Monitoring and maintenance of erosion and sediment control measures throughout the course of construction shall be required. Sediment shall be removed once the volume reaches ¼ to ½ the height of the erosion control.
f. Divert runoff from offsite and undisturbed areas away from construction to minimize soil erosion and sedimentation on and off-site. Temporarily stabilize all highly erodible soils and slopes immediately.
g. Land disturbance activities exceeding two acres in size shall not be disturbed without a sequencing plan that requires stormwater controls to be installed and exposed soils stabilized, as disturbance beyond the two acres continues. A construction phasing plan, including erosion and sediment control plan for each phase, shall be submitted to the DEC prior to any construction on the site. Mass clearings and grading of the entire site shall be avoided.
h. Soil stockpiles must be stabilized or covered at the end of each workday. Stockpile side slopes shall not be greater than 2:1. All stockpiles shall be surrounded by sediment controls.
i. Disturbed areas remaining idle for more than 14 days shall be temporarily or permanently stabilized.
j. Permanent seeding shall be undertaken in the spring from March through May, and in late summer and early fall from August to October 15. During the peak summer months and in the fall after October 15, when seeding is found to be impractical, an appropriate temporary mulch and/or non-asphaltic soil tackifier with winter rye shall be applied. Permanent seeding may be

undertaken during the summer if plans provide for adequate mulching and watering.

k. Anti-tracking pad(s) shall be constructed at all entrance/exit points of the site to reduce the amount of soil carried onto roadways and off the site. Dust shall also be controlled at the site.
l. All slopes steeper than 3:1 (h:v, 33.3%), as well as perimeter dikes, sediment basins or traps, and embankments must, upon completion, be immediately stabilized with sod, seed and anchored straw mulch, or other approved stabilization measures.
m. Temporary sediment trapping devices must not be removed until permanent stabilization is established in all construction areas associated with the project. Similarly, stabilization must be established prior to converting temporary sediment traps/basins into permanent (post-construction) stormwater management facilities. All facilities used for temporary measures shall be cleaned and re-stabilized prior to being put into final operation.
n. All temporary erosion and sediment control measures shall be removed after final site stabilization. Disturbed soil areas resulting from the removal of temporary measures shall be permanently stabilized within 30 days of removal.

- Other applicable controls and/or information as may be required by the DEC.
- All plans, reports and calculations required as part of the erosion and sediment control plan must be stamped and certified by a professional engineer.
- Projects disturbing one acre of more are required to obtain a Construction General Permit (CGP) from the US EPA. A copy of the CGP must be filed with the DEC prior to issuance of a building permit for all applicable projects."

Per 974 CMR 3.02.3.e.5.g "Land disturbance activities exceeding two acres in size shall not be disturbed without a sequencing plan that requires stormwater controls to be installed and exposed soils stabilized, as disturbance beyond the two acres continues. A construction phasing plan, including erosion and sediment control plan for each phase, shall be submitted to the DEC prior to any construction on the site. Mass clearings and grading of the entire site shall be avoided."

Recommended Modification: Consider possibly lowering this two-acre threshold to one acre to better align with the permit 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 Devens' Regulations that Support Permit Requirement: Devens shall continue implementation of 974 CMR 3.02(3)(e) and conditions of all site development approvals that require ESC plan and DEC inspection of all controls prior to commencement of construction. Standard conditions of approval also require Applicant maintain an ESC log for all controls that is to be made available for inspection by DEC.

Recommended Modification: Documentation of existing site inspection and enforcement procedures is required, including responsibility for site inspections as well as authority to implement enforcement procedures.

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 Devens' Regulations that Support Permit Requirement: 974 CMR 3.02(3)(e) states that "All site plan submissions shall include an Erosion and Sediment Control Plan containing sufficient information to describe the nature and purpose of the proposed development, pertinent conditions of the site and the adjacent areas, and proposed erosion and sedimentation controls. The plan shall include such detail as is necessary to demonstrate that the proposed development will comply with Massachusetts Department of Environmental Protection Stormwater Management Standards, the Devens Stormwater Pollution Prevention Plan (SWPPP) and 974 CMR 3.04 design standards. The Devens SWPPP provides guidance om measures that may be utilized to prevent erosion and sedimentation during construction activities. The Erosion and Sediment Control Plan shall include the following:

…..

5. Location and details of all erosion and sediment control measures with a narrative of the construction sequence/phasing of the project, including both Operation and Maintenance for structural and non-structural control measures and best management practices, interim grading, and material stockpiling areas in accordance with the Devens Stormwater Pollution Prevention Plan and Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas. Such narrative and Operation and Maintenance Plan for temporary and permanent erosion control measures during Construction, shall be included on the erosion and sediment control plan and include but not be limited to, the following requirements:

…

b. Perimeter sediment control system shall be installed prior to soil disturbance and maintained to contain soils on-site. Areas outside of the perimeter sediment control system must not be disturbed unless the Applicant has obtained prior approval from the DEC.

c. Measures shall be taken to control erosion within the project area. Sediment in runoff water shall be trapped and retained within the project area and street sweeping of adjacent Streets and Roads shall be included where necessary.

…

e. Monitoring and maintenance of erosion and sediment control measures throughout the course of construction shall be required. Sediment shall be removed once the volume reaches ¼ to ½ the height of the erosion control.

f. Divert runoff from offsite and undisturbed areas away from construction to minimize soil erosion and sedimentation on and off-site. Temporarily stabilize all highly erodible soils and slopes immediately.

g. Land disturbance activities exceeding two acres in size shall not be disturbed without a sequencing plan that requires stormwater controls to be installed and exposed soils stabilized, as disturbance beyond the two acres continues. A construction phasing plan, including erosion and sediment control plan for each phase, shall be submitted to the DEC prior to any construction on the site. Mass clearings and grading of the entire site shall be avoided.

h. Soil stockpiles must be stabilized or covered at the end of each workday. Stockpile side slopes shall not be greater than 2:1. All stockpiles shall be surrounded by sediment controls.

i. Disturbed areas remaining idle for more than 14 days shall be temporarily or permanently stabilized.

j. Permanent seeding shall be undertaken in the spring from March through May, and in late summer and early fall from August to October 15. During the peak summer months and in the fall after October 15, when seeding is found to be impractical, an appropriate temporary mulch and/or non-asphaltic soil tackifier with winter rye shall be applied. Permanent seeding may be undertaken during the summer if plans provide for adequate mulching and watering.

k. Anti-tracking pad(s) shall be constructed at all entrance/exist points of the site to reduce the amount of soil carried onto roadways and off the site. Dust shall also be controlled at the site.

l. All slopes steeper than 3:1 (h:v, 33.3%), as well as perimeter dikes, sediment basins or traps, and embankments must, upon completion, be immediately stabilized with sod, seed and anchored straw mulch, or other approved stabilization measures.

m. Temporary sediment trapping devices must not be removed until permanent stabilization is established in all construction areas associated with the project. Similarly, stabilization must be established prior to converting temporary sediment traps/basins into permanent (post-construction) stormwater management facilities. All facilities used for temporary measures shall be cleaned and re-stabilized prior to being put into final operation."

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 Devens' Regulations that Support Permit Requirement: Waste disposal and recycling affidavits are required as part of the building permit process: http://www.devensec.com/forms/Building_Permit_2016.pdf (see page 2). Devens Enterprise Commission Determination of Completeness requirements also require applicants to identify waste disposal methods as part of the site plan (recycling, composting, reuse): http://www.devensec.com/forms/DOC_Form_2012.pdf (see page 3). Recycling and waste management guidelines, including guidelines for construction waste, are publicly available at http://www.devensec.com/news/Recycling_Guidance_Document_updated_final_6-6-19.pdf.
Copies of these documents are also included in Appendix G.

Per 974 CMR 3.02(3)(e)(4), the Erosion and Sediment Control Plan shall also include the following:
…..
"4. A description of construction and waste materials expected to be stored on-site. The Plan shall include a description and details of controls to reduce pollutants from these materials, including storage practices to minimize exposure of the materials to stormwater, and spill prevention and response."

Site Plan Review Inspection and Enforcement

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

Recommended Modification: Separate documentation of existing in-house site plan review procedures is required, including inspection and enforcement procedures. Much of what is required is included in existing regulations and just needs to be pulled out to create a separate stand-alone document for in-house use.

3.3.3 Post-Construction Stormwater Management

The 2016 MS4 Permit requires the following as it relates to post construction runoff from new development and redevelopment:

Regulate Post-Construction Runoff from New and Re-Development Disturbing Greater than One Acre

Permit Requirement: Develop, implement and enforce a program to address post-construction stormwater runoff from new development and redevelopment that disturbs greater than one acre and discharges into the MS4. The program shall also 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, Devens is required to develop a regulatory mechanism to address post-construction stormwater runoff from properties that disturb greater than one acre and discharge to the MS4 by requiring the use of sediment and erosion control practices at construction sites. This regulatory mechanism is required to be developed and adopted, where feasible, no later than three years from the permit effective date.

Excerpts from Devens' Regulations that Support Permit Requirement: Continue to require compliance with Devens Enterprise Commission (DEC) regulatory requirements for post-construction runoff from new development and re-development as included in 974 CMR 4.08 and 4.09.

Low Impact Development

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

Excerpts from Devens' Regulations that Support Permit Requirement: LID is addressed in numerous places, including in the DEC Regulations 974 CMR 3.04.4.a.3 where it states that "Low Impact Development (LID) Stormwater Management Design shall be incorporated into the site plan to allow for the full utilization of the property while maintaining the pre-development characteristics of the site as though it were a "green field" (volume, frequency, peak runoff rate) to the maximum extent feasible. Maximizing the use of pervious areas minimizes stormwater runoff from a site, improves stormwater quality, and increases groundwater recharge. Maintenance of these on-site stormwater management systems must be incorporated into facility operations, and is the responsibility of the landowner. For requirements, design standards, and criteria for LID techniques, refer to 974 CMR 4.08."

Per the requirements outlined in CMR 3.04(4)(a)1. & 974 CMR 4.08, Devens will continue to utilize and improve on green infrastructure guidelines to guide, regulate and incentivize green infrastructure on all development and redevelopment projects. The Green Infrastructure Guidelines adopted by Devens in August 2014 are included in Appendix G. This document is intended to provide applicants with a better understanding of what Green Infrastructure is, the local incentives to promote Green Infrastructure, and guidance on how to strategically locate and incorporate Green Infrastructure into projects to meet multiple regulatory requirements within the DEC Rules and Regulations. Devens shall also continue to monitor impervious surface reductions in Devens Sustainable Indicators Reports.

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 Devens' Regulations that Support Permit Requirements: As referenced in 974 CMR 4.08.2.a "All applications, regardless of whether the project is subject to the Wetland Protection Act or not, shall design the stormwater management system in compliance with the Massachusetts DEP Stormwater Management Standards, January, 2008, as amended ("SMS") and the Massachusetts Stormwater Handbook, February 2008, as amended ("Handbook"). The applicant shall submit a completed and endorsed Stormwater Management Form that indicates compliance with the SMS, in addition to any supporting calculations indicating compliance with the required 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 Devens' Regulations that Support Permit Requirement: As referenced in 974 CMR 4.08.2.a "All applications, regardless of whether the project is subject to the Wetland Protection Act or not, shall design the stormwater management system in compliance with the Massachusetts DEP Stormwater Management Standards, January, 2008, as amended ("SMS") and the Massachusetts Stormwater Handbook, February 2008, as amended ("Handbook"). The applicant shall submit a completed and endorsed Stormwater Management Form that indicates compliance with the SMS, in addition to any supporting calculations indicating compliance with the required standards."

Per 974 CMR 3.04(4), "site generated stormwater shall be managed on-site to meet green field requirements. Conveyance to a common system (operated by the owners of more than one lot), or to the Devens Stormwater System (DSS), managed by MassDevelopment is an option once green field requirements have been met and all reuse and on-site infiltration methods have been exhausted."

Recommended Modification: In those instances where green field requirements have been met and all reuse and on-site infiltration methods have been exhausted, a requirement should be added that all stormwater management systems shall be designed to "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."

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 Devens' Regulations that Support Permit Requirement: As referenced in 974 CMR 4.08.2.a "All applications, regardless of whether the project is subject to the Wetland Protection Act or not, shall design the stormwater management system in compliance with the Massachusetts DEP Stormwater Management Standards, January, 2008, as amended ("SMS") and the Massachusetts Stormwater Handbook, February 2008, as amended ("Handbook"). The applicant shall submit a completed and endorsed Stormwater Management Form that indicates compliance with the SMS, in addition to any supporting calculations indicating compliance with the required standards."
There is not currently language included in the existing regulations, which makes a distinction between new and redevelopment. Currently, all redevelopment projects are subject to the same requirements as new development projects. Confirm whether the DEC will make a distinction going forward and whether offsite mitigation shall be allowed for redevelopment projects and modify regulations accordingly.

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 in part d. 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 d fully.

Potential Modification if Exemption is Not Already Included: "Maintenance and redevelopment activities to existing roads including repaving, drainage infrastructure improvements, adding shoulders, or correcting intersections shall be exempt from other requirements in this part. Projects of this nature should consider options to improve any existing conditions by incorporating LID techniques or other stormwater best management practices and include in the construction permit application process a narrative describing that investigation's conclusions and chosen results when possible. Any road construction that increases the impervious surface by more than a single lane will not be covered under this exemption and shall be subject to all requirements for new and redevelopment."

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 Devens' Regulations that Support Permit Requirement: The DEC shall continue to require the submission of as-builts prior to occupancy. Per 974 CMR 1.09, "a permit is completed upon application of a Certificate of Occupancy, Wetlands Certificate of Compliance, and submission of an as-built plan. Per 974 CMR 2.06 (4) (b), As-Built Plan., "Upon completion of construction, and before release of a performance guarantee, the DEC may require the Applicant to prepare and submit As-Built Plans at the same scale as the Street and/or Road plans, which shall indicate all of the following:

1. Boundaries of the Right-of-Way;
2. Location and elevations of roadway Improvements;
3. Driveway locations;
4. Permanent monuments;
5. Location and inverts, with elevation, of the required Utilities, hydrants and drainage including the location, with ties, and depth of sewer and water laterals serving each Lot;
6. Location of any other underground Utilities, such as natural gas, electricity, telephone lines, and street lighting;
7. Lot boundaries; and,
8. Centerline stationing.

The Applicant's Surveyor or Engineer shall certify that the ways and services as shown in the As-Built Plans are complete and the As-Built Plans are accurate. The DEC shall accept the As-Built Plans upon determining that their content and form comply with 974 CMR 2.00." The DEC requirements for as-built submissions are available to applicants on their website at http://www.devensec.com/development/As-built_Policy.pdf and is also included in Appendix G.

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 Devens' Regulations that Support Permit Requirement: The DEC shall continue current procedures which require the development of O&M Plans as part of the permitting process and as a condition of occupancy. The DEC shall also continue to require property owners to file annual reports regarding system maintenance to the DEC.

Site Plan Review requires submission of a Stormwater Operation and Maintenance Plan in accordance with 974 CMR 3.04(4) and 974 CMR 4.08. The Site Plan must specify the construction

and post-development maintenance schedule in detail on the utility plan. Per 974 CMR 4.08, "An Operation and Maintenance Plan (O&M Plan) for stormwater management systems is required at the time of application for all projects. The O&M Plan shall be designed to ensure compliance with the Massachusetts Surface Water Quality Standards (314 CMR 4.00), the Stormwater Plan and the DEC annual stormwater reporting form requirements. The O&M Plan shall be shown on the site plan(s) and shall include at a minimum the following:

"(a) The name(s) of the owner(s) for all components of the system.
(b) A statement that the Applicant is responsible for the operation and maintenance of the entire on-site system.
(c) An O&M Inspection and Maintenance Schedule which shall include:

1. Parking Lot Sweeping: with mechanized cleaning equipment on an annual basis.
2. Catch Basin Cleaning: Catch Basins and Infiltration Chamber shall be inspected on a bi-annual basis. Any sediment accumulations in excess of half of the unit's sump depth shall be removed. Material shall be removed by a licensed contractor, who shall be responsible for disposing of the material off-site in a manner consistent with all local, state and federal regulations.
3. Infiltration Swales: Ensure proper establishment of full vegetative cover. Swale embankments and side slopes must be properly maintained to ensure long-term stability. Annual and seasonal inspections are required to ensure a healthy groundcover is maintained to avoid erosion and promote infiltration. Bare spots shall be repaired and planted with native ground cover material. Saplings and large shrubs shall be removed to maintain integrity of the swale. Level spreader shall be inspected seasonally to remove any build-up of sediment and ensure proper drainage flows.
4. Detention/Retention Basin Inspection and Maintenance: Wet and dry basins shall be inspected annually to ensure inlets and outlets remain unobstructed. Inlets and outlets and forebays shall also be inspected for potential sediment, erosion, cracking, tree growth, damage to the emergency spillway and erosion within the basin and on within the banks. Upper side slopes, embankment and emergency spillway shall be mowed annually. Any tree saplings shall be removed. Accumulated sediment shall be removed as necessary and at least once every ten years. Bare spots shall be repaired and planted with native ground cover material.
5. Biofiltration Systems: Quarterly inspections for accumulated sediment shall be performed. Debris, sediment accumulation, erosion shall be removed/repaired at least twice a year. Any dead or damaged plantings shall be replaced. All invasive species shall be removed on an annual basis. Re-mulch any void areas by hand. Native grasses and plants shall be maintained by hand without the use of fertilizers and limited use of organic herbicides. Trimming of surrounding grasses shall be restricted to a minimum of 5 inches. When cation exchange capacity of soil media decreases, the soil media shall be replaced to prevent contaminants from reaching the groundwater.
6. Sediment Trap/Oil-Water Separator: Shall be inspected annually for sediment and debris accumulation. Any sediment accumulations in excess of half of the unit's sump depth shall be removed. Material shall be removed by a licensed contractor, who shall be responsible for disposing of the material off-site in a manner consistent with all regulations.

7. Sub-Surface Infiltration Systems: Shall be inspected annually for proper function and sediment accumulation. Accumulations of sediment and/or materials that negatively impact the infiltration capacity of the system shall be removed.
8. Constructed Stormwater Wetlands: In the first three years after construction, Applicants shall inspect the constructed stormwater wetlands twice a year during both the growing and non-growing seasons. After three years such inspections shall occur on a periodic basis. During these inspections, the following information shall be recorded:
   a. The types and distribution of the dominant wetland plants in the marsh;
   b. The presence and distribution of planted wetland species;
   c. The presence and distribution of invasive wetland species (invasives shall be removed);
   d. Indications that other species are replacing the planted wetland species;
   e. Percentage of standing water that is unvegetated (excluding the deep water cells which are not suitable for emergent plant growth);
   f. The maximum elevation and the vegetative condition in this zone, if the design elevation of the normal pool is being maintained for wetlands with extended zones;
   g. Stability of the original depth zones and the micro-topographic features; and
   h. Accumulation of sediment in the forebay and micropool; and survival rate of plants (cells with dead plants must be replanted). Sediment forebays must be cleaned annually.

(d) Applicants shall submit annual stormwater monitoring and maintenance reports to the DEC addressing inspection and maintenance of the BMPs. The reports shall include:
   1. Descriptions of the condition of the BMPs,
   2. Descriptions of maintenance performed and,
   3. Receipts for maintenance performed.

For ease of reporting, the DEC and MassDevelopment have created standard annual reporting templates for use by all Applicants. Failure to submit the required annual report is a violation of the Unified Permit."

Phosphorous Impairment:

Permit Requirement: For discharges to water quality limited water bodies and their tributaries where phosphorous is the cause of the impairment, the permittee's regulatory mechanism for Stormwater Management in New Development and Redevelopment (Year 4 Permit Requirement), shall include a requirement that new development and redevelopment stormwater management BMPs be optimized for phosphorus removal.

Recommended Modification: In Section 974 CMR 4.08(3), Design Standards and Criteria, language should be added, which requires that all BMPs installed are optimized for phosphorous removal and also that there be a methodology in place for evaluating BMP performance. Include the following statement, "To support compliance with the MS4 Permit, all BMPs must be optimized for the removal of phosphorous. The justification and design of such BMPs must also include a methodology for assessing BMP performance. Pollutant removal shall be consistent with EPA Region 1's Evaluation tool."

4.0 IDDE MONITORING AND PROGRESS

4.1 IDDE Plan

As a new permittee not previously covered under the 2003 MS4 Permit, Devens must establish legal authority to prohibit illicit discharges, investigate suspected illicit discharges, eliminate illicit discharges, and implement enforcement procedures through adoption of a new or modification of an existing regulatory mechanism. Under the new MS4 Permit, Devens is required to implement their Illicit Discharge Detection and Elimination Investigation Program by presenting a defined approach to investigate, identify and remove illicit connections. Devens is required to adopt a regulatory mechanism no later than Year 3 of the Permit, and develop the written plan in Year 4. Devens must then continue to implement the plan throughout the permit term.

As part of Minimum Control Measure No. 3, Illicit Discharge Detection and Elimination (IDDE), Devens 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 drainage system.
2. Ensuring that appropriate regulatory mechanisms and enforcement procedures are in place to prohibit illicit discharges.
3. Developing and implementing a written plan to detect and eliminate illicit discharges, which references the required 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.

Such measures will be performed with the goal of finding and removing all 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 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, and these discharges should be highlighted in any regulatory mechanism adopted.

4.1.1 Mapping

Devens had already developed a comprehensive map of their drainage system, which includes outfalls, pipes, manholes, catch basins, municipally owned stormwater treatment structures and impaired water bodies. Interconnections with other MS4s are in the process of being identified, and outfalls and interconnection are being 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 considers each catch basin upstream from the outfall or interconnection and the area that would conceivably drain to that catch basin based on topography. 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.

Mapping has been in accordance with the 2016 MS4 Permit's accuracy guidelines and has been recorded on a publicly available map, the most recent version of which can be found at the end of Section 1.0 of this report.

Drainage infrastructure within Devens' boundaries has been reviewed to determine ownership. Private infrastructure or infrastructure owned and operated by another municipality, state or federal entity has been determined and designated in Devens' drainage GIS.

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

4.1.2 Catchment Prioritization and Ranking

Devens is working to develop 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 to be considered in the prioritization and ranking of catchments includes:

- Past discharge complaints and reports
- Receiving water quality
- Density of generating sites.
- Age of development and infrastructure
- Culverted streams
- Water body impairments

This inventory and ranking will be documented in the Devens' 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. It will also be documented in the Devens' MS4 Annual Reports.

4.1.3 Field Investigation

The MS4 Permit requires Devens 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, Devens will work to eliminate the illicit discharge as expeditiously as possible. When the specific source of an illicit discharge is identified, Devens will exercise its authority as necessary to require its removal. Devens will notify all responsible parties of any such discharge and require immediate cessation of improper disposal practices in accordance with its legal authorities.

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.

Devens 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, Devens 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.

Devens has had five (5) SSO occurrences in the five years prior to the permit effective date to present. These include the following:

- On April 7, 2015, an SSO was called in by a UPS delivery driver on Lovell Street near Hospital Road. Flow discharged overland from a sewer manhole and then entered Tail Race Brook via surface runoff. The volume of the discharge was approximately 8,200 gallons. The blockage was caused by a traffic cone lodged in a sewer siphon. Because almost all the flow in that portion of the system is from an upstream pump station, the pump station was shut down and a vactor truck was used to remove the blockage. The affected area was treated with lime. Additional cleaning was performed to ensure that no other obstructions were present.

- On July 20, 2015, an SSO was called in by a United Water worker near 270 Jackson Road. Flow discharged overland from a sewer manhole and then entered Willow Brook via surface runoff. The volume of the discharge was approximately 750 gallons. During an ongoing sewer main replacement project, a partial collapse occurred, causing the SSO. A temporary bypass was set up and the sewer main was eventually replaced. The affected area was treated with lime.

- On August 8, 2016, an SSO was called in by a contractor near 200 Jackson Road. Flow discharged from a gravity sewer main to the ground surface. The source was believed to be a crack in the sewer main. The volume of the discharge was intermittent based on flow and ranged from 0-1 GPM. The contractor televised the pipe to locate the source and scheduled for the pipe to be repaired.

- Another SSO occurred on August 8, 2016 at 249 Barnum Road, which was observed by the Board of Health. Flow discharged from a gravity sewer main to the ground surface. The volume of the discharge was approximately 3 gallons. A temporary repair was made until a new main connection was made on August 10, 2016.

- On December 20, 2017, an SSO occurred at SMH #879 in the woods located behind the Barnum Road Pump Station and discharged to the ground surface. The volume of the discharge was approximately 900 gallons. It was estimated that 15 gpm was leaking from the sewer manhole cover for a period of 60 minutes. The cause of the SSO event appeared to be a sewer system blockage and the entire gravity line was jetted approximately 200-feet. However, no roots or material was actually observed during jetting. The downstream pump

station wet well was checked for any debris that may have caused this back-up. No debris was identified and there were no issues with the pumps. Corrective actions taken included spraying 10 gallons of sodium hypochlorite on the affected area.

Devens will maintain this SSO inventory as part of this plan and their IDDE Plan. Information will also be included in Devens' MS4 Annual Reports, including the status of mitigation and corrective measures to address each identified SSO.

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

The inventory of municipal facilities will be developed no later than Permit Year 4.

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 four years of the permit effective date, except for procedures for winter road maintenance, which are required to be developed within three years of the permit effective date. The SOP for winter road maintenance, which includes snow removal and deicing, will be included in Appendix I along with additional SOPs developed in Permit Year 4.

5.4 Catch Basin Cleaning and Optimization

Devens currently has approximately 1,630 catch basins. Approximately 50% of Devens' catch basins are cleaned per year using in-house staff and equipment. Catch basin cleanings are stockpiled in a self-contained erosion-free area at the DPW yard. When the piles are large enough, they are transported to a landfill. To meet the anticipated requirements of the new MS4 Permit,

Devens 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, Devens must document the finding, investigate the contributing drainage area for sources of excessive sediment loading, and to the extent practicable, abate contributing sources.

- Devens 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.

- Devens must track and report the following information to EPA annually:

    - Total number of catch basins community-wide
    - Number of catch basins inspected
    - Number of catch basins cleaned
    - Total volume or mass of material removed from all catch basins

Devens will collect additional data during the 2019 cleaning season as part of their optimization plan to ensure that no catch basin is more than 50% full. Data collected will include depth from the catch basin rim to the top of sediment, to the bottom of the basin, and to the invert of the outlet pipe. Data will again be collected during the 2020 catch basin cleaning season, including depth from the rim to the top of sediment. This data will be integrated into the Devens' 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. Devens does not currently discharge to any receiving waters that have an approved TMDL, nor is Devens located in a watershed for which a TMDL has already been developed.

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 for one or more designated uses and require a TMDL. In Devens, this includes the Nashua River (Segment MA-81-05) which is impaired for phosphorus and E. Coli; and Catacoonamug Brook (MA81-74) which is impaired for E. Coli.

6.2 Phosphorus Impairments

The Nashua River is impaired for phosphorus and requires the development of a TMDL. Devens has a number of outfalls, which discharge directly or indirectly, to the Nashua River and therefore, Devens is subject to the requirements of Appendix H of the MS4 Permit, which outlines requirements related to discharges to water quality limited water bodies and their tributaries where phosphorus is the cause of the impairment.

6.2.1 Public Education and Outreach

Devens must distribute additional educational messages to residential property owners, businesses, and commercial institutions about the proper use and disposal of grass clippings, and to encourage the use of slow release and phosphorous-free fertilizers annually in the spring, between March and April. An additional pet waste message must also be distributed to residents annually in the summer, between June and July, encouraging the proper management of pet waste and noting any existing bylaws where appropriate. In the Fall (August/September/October), an educational message detailing the proper disposal of leaf litter must be distributed to residential and commercial property owners. Devens must begin distribution of all required messages within three years of the permit effective date. Messages that have been distributed to date are included in Appendix F of this report.

6.2.2 Regulatory Updates

Devens must also update their regulations to require that all new development and redevelopment stormwater management BMPs constructed within Devens be optimized for phosphorous removal. A comprehensive review of all existing rules and regulations must be performed within four years of the permit effective date to determine any updates that must be made to comply with this statute and any progress shall be reported here and in Devens' Annual Report.

In addition, as part of the assessment to identify permittee-owned property that can be retrofitted with BMPs, the incorporation of BMPs that infiltrate stormwater shall be prioritized where feasible to aid in phosphorus removal.

6.2.3 Good Housekeeping and Pollution Prevention

Devens shall develop and implement a program to manage grass clippings and leaf litter on all permittee-owned property, including prohibiting blowing organic waste materials onto adjacent impervious surfaces, within four years of the permit effective date. That plan shall be appended here.

Devens shall increase street and municipal parking lot sweeping frequencies to a minimum of two times per year within three years of the permit effective date, in the spring after snowmelt and sanding practices have subsided, and in the fall after leaf fall events (September 1st to December 1st). A street sweeping schedule shall be included in this plan and in Devens' Annual Reports.

6.2.4 Phosphorus Source Identification

Devens must develop a comprehensive Phosphorous Source Identification Report within 6 years of the permit effective date. This report must include the following elements:

- Calculation of the total MS4 regulated area draining to the Nashua River. The analysis will reflect any updated MS4 mapping and catchment delineations.
- Outfalls discharging directly to the Nashua River will be tested for phosphorus during dry and wet weather sampling events, where flowing.
- Calculation of Impervious Area and Directly Connected Impervious Area for each catchment.
- Identification, delineation and prioritization of potential catchments with high phosphorous loading.
- Identification of potential retrofit opportunities or opportunities for the installation of structural BMPs during redevelopment, including the removal of impervious area to reduce phosphorous loadings.

This report must be appended to Devens' Year 6 Annual Report and to this SWMP upon completion.

After the submission of the report, Devens' must evaluate all permittee-owned properties within the drainage area that could be candidates for a BMP retrofit. This evaluation must include:

- The next planned infrastructure, resurfacing or redevelopment activity planned for the property or planned retrofit date;
- The estimated cost of redevelopment or retrofit BMPs; and
- The engineering and regulatory feasibility of redevelopment of retrofit BMPs.

This analysis must be complete within 7 years of the permit effective date, and a plan and schedule for implementation must be included in the Year 7 Annual Report. Devens must plan and install at least one structural BMP as a demonstration project within the drainage area of the Nashua River within 8 years of the permit effective date. This BMP must target a catchment with high phosphorus load potential. Any other identified BMP retrofit project must be installed according to the schedule outlined in the Year 7 Annual Report. For those structural BMPs installed, Devens must document the following in each MS4 Annual Report:

- BMP type
- Total area treated by the BMP
- Design storage volume of the BMP
- Estimated phosphorus removed in mass per year by the BMP

6.3 Bacteria Impairments

Since the Nashua River and the Catacoonamug Brook are impaired for E. Coli and require the development of a TMDL, Devens is subject to the requirements of Appendix H of the MS4 Permit, which outlines the requirement related to discharges to water quality limited water bodies where bacteria or pathogens is the cause of the impairment.

6.3.1 Public Education and Outreach

Devens has a comprehensive public education program for multiple purposes and has easily been able to add in specific, targeted information regarding actions that can be taken to reduce sources of bacteria from outfalls tributary to the Nashua River and Catacoonamug Brook.

Devens must supplement its residential public education program by distributing information to pet owners within those catchments tributary to the Nashua River and Catacoonamug Brook about the proper management of pet waste, including noting any existing bylaws. This message must be disseminated to all residents annually and pet owners at the time of pet license issuance and renewal, beginning in the first year of the permit. This informational campaign can be combined with the phosphorus education requirements outlined in Section 6.2.1.

Devens is almost 100% on sewer, although there is one (1) property on septic. Devens will distribute information to the septic system owner about proper maintenance.

In implementing their Illicit Discharge Detection and Elimination Program, Devens will designate all catchments that are tributary to the Nashua River and Catacoonamug Brook as problem or high priority under the catchment prioritization and ranking.

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 30th, 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.

Devens will append future annual reports in compliance with the 2016 MS4 Permit as they are prepared in Appendix I.

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 Devens 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.

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

7.3 Modifications to the SWMP or Notice of Intent

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

- At any time, Devens may add (but not subtract or replace) components, controls or requirements to the SWMP if written notification is made to EPA and MADEP.

- Devens may request to replace an ineffective or infeasible BMP specifically identified in the SWMP with an alternative BMP at any time if the request is made in writing to EPA and MADEP. Unless the request is denied, changes proposed in accordance with the criteria below shall be deemed approved and may be implemented 60 days from submittal of the request. If the request is denied, EPA or MADEP, as applicable, will send Devens a written explanation of the denial.

- Modification requests must include the following information:

    - An analysis of why the BMP is ineffective or infeasible (or cost prohibitive).

    - Expectations on the effectiveness of the replacement BMP.

    - An analysis of why the replacement BMP is expected to achieve the goals of the BMP to be replaced.

- Change requests or notifications must be made in writing to EPA (with copy to MADEP) and signed in accordance with EPA signatory requirements.

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

Weston & Sampson℠

westonandsampson.com

55 Walkers Brook Drive, Suite 100
Reading, MA 01867
tel: 978.532.1900

STORMWATER MANAGEMENT PLAN APPENDICES

MS4 GENERAL PERMIT COMPLIANCE

JUNE 2019

DEVENS MASSACHUSETTS

Devens
MASSACHUSETTS

swmp

APPENDICES

APPENDIX A

Abbreviations and Definition

ABBREVIATIONS AND DEFINITIONS

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

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

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

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

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

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

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

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

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

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

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 this permit. The term also includes those facilities designated under the provisions of 40 CFR 122.26(a)(1)(v).

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

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

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

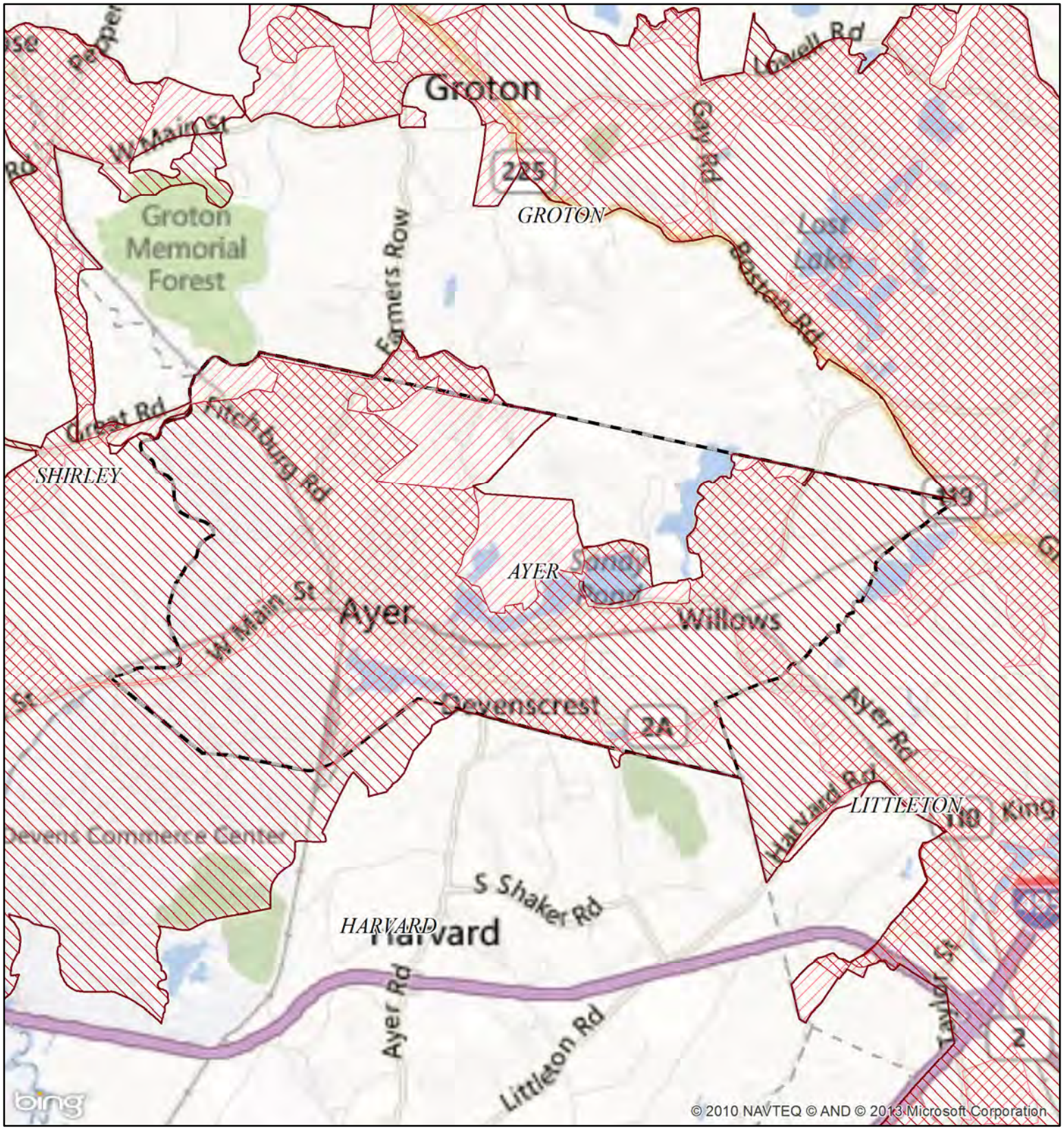
Water Quality Standards - A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses. States and EPA adopt WQS to protect public health or welfare, enhance the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

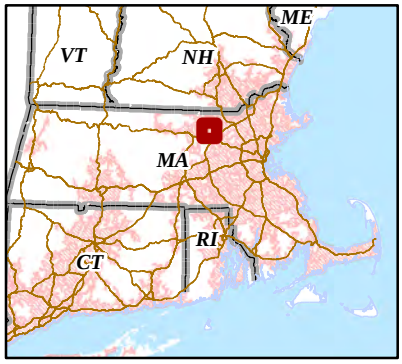
ABBREVIATIONS AND ACRONYMS

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

APPENDIX B

Regulated Area Maps





NPDES Phase II Stormwater Program
Automatically Designated MS4 Areas

Ayer MA

Regulated Area:

UA Based on 2000 Census | UA Based on 2010 Census

0 1 2 3 Kilometers

0 1 2 3 Miles

Town Population: 7427

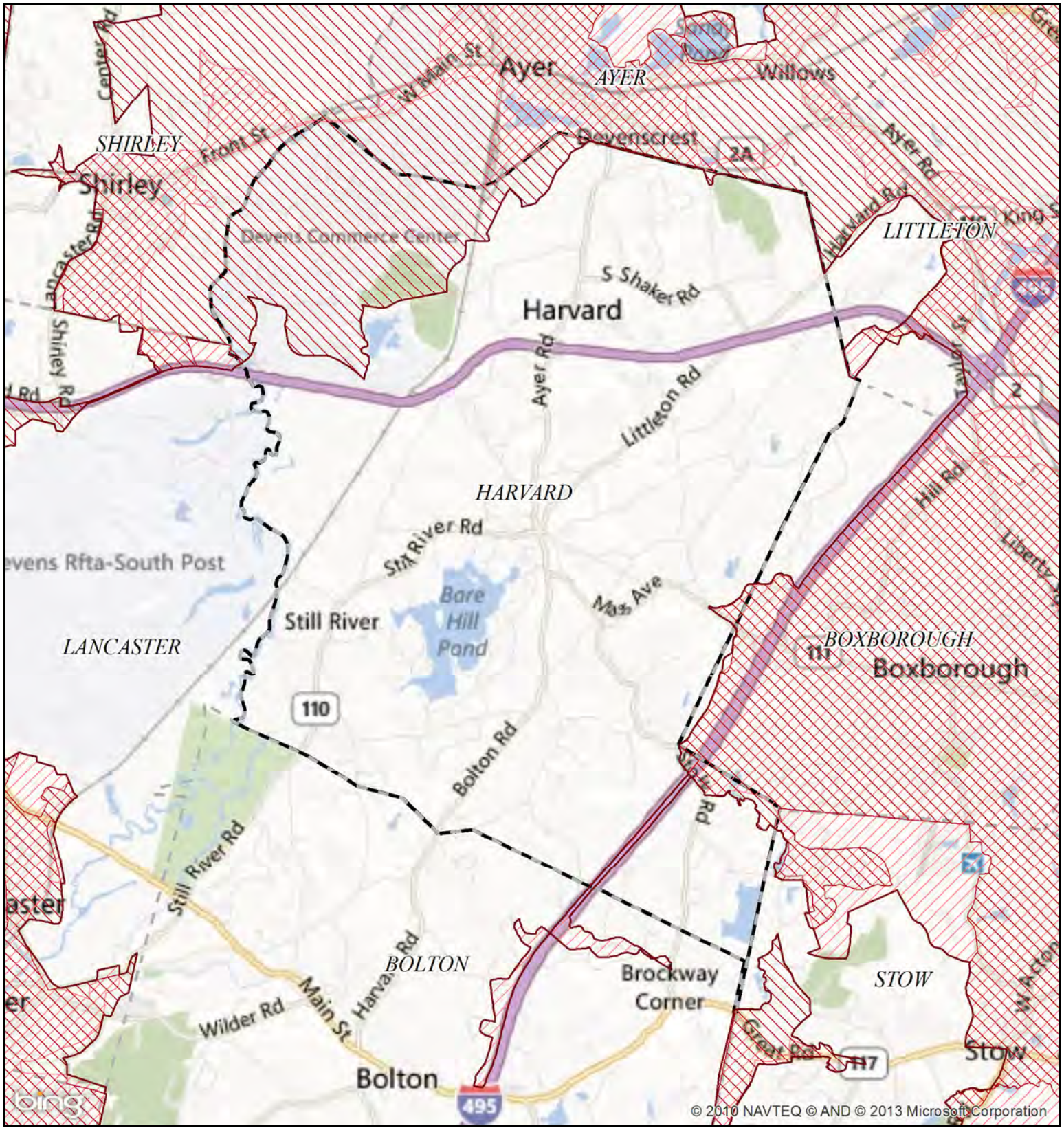
Regulated Population: 7367

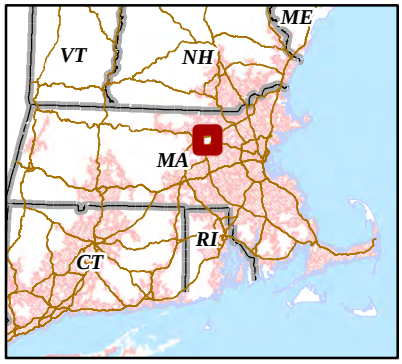
(Populations estimated from 2010 Census)

EPA

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

US EPA Region 1 GIS Center Map #8824, 8/9/2013





NPDES Phase II Stormwater Program
Automatically Designated MS4 Areas
Harvard MA

Regulated Area:

UA Based on 2000 Census | UA Based on 2010 Census

0 1 2 3 4 5 Kilometers

0 1 2 3 4 Miles

Town Population: 6522

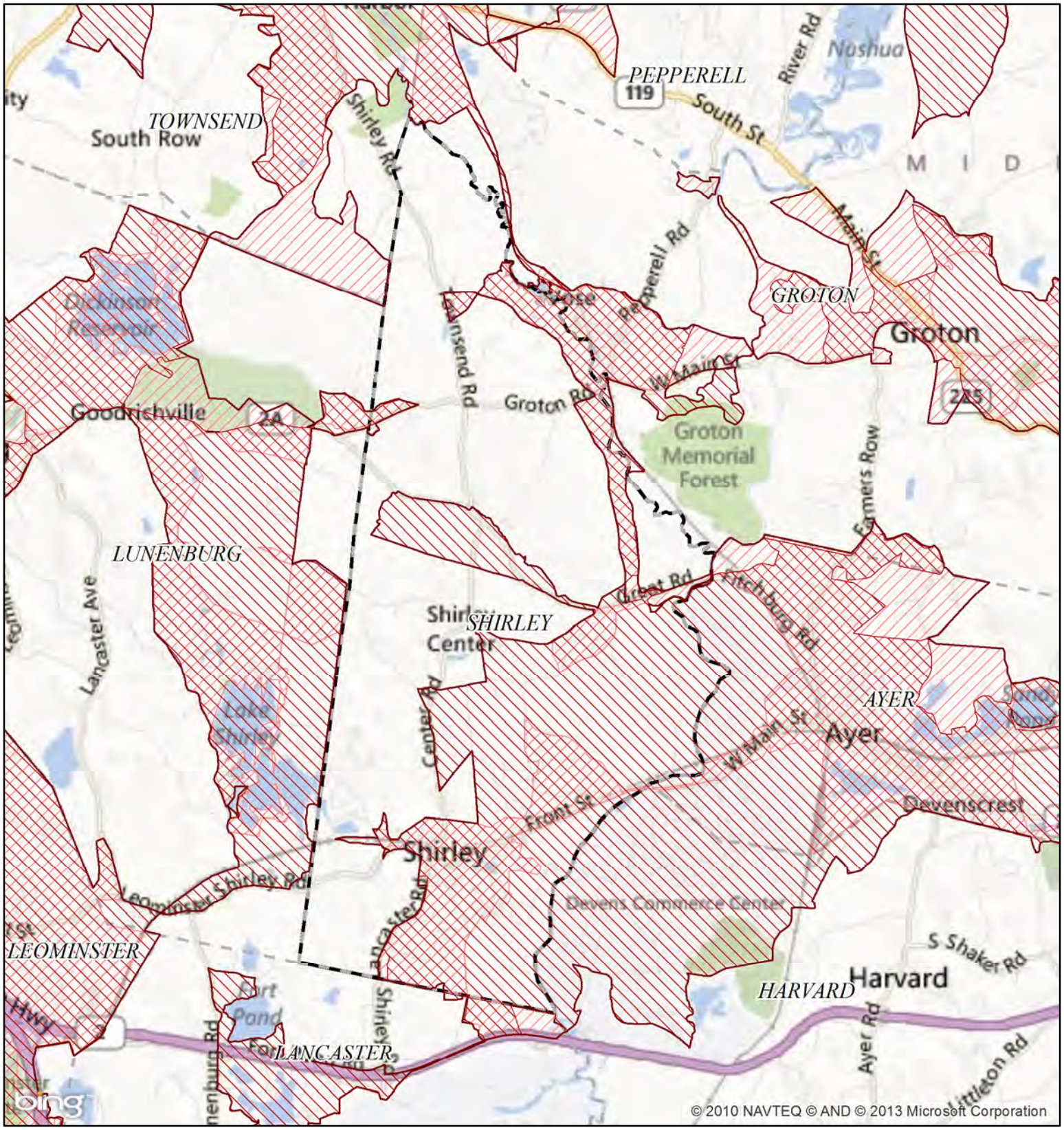
Regulated Population: 1538

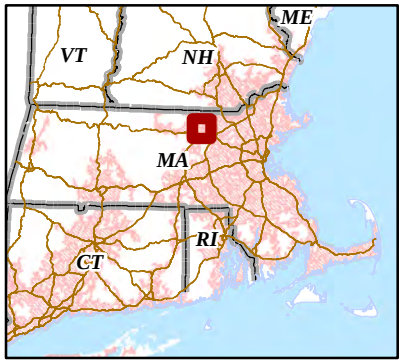
(Populations estimated from 2010 Census)

EPA

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

US EPA Region 1 GIS Center Map #8824, 8/9/2013





NPDES Phase II Stormwater Program
Automatically Designated MS4 Areas

Shirley MA

Regulated Area:

UA Based on 2000 Census | UA Based on 2010 Census

0 1 2 3 4 5 Kilometers

0 1 2 3 4 Miles

Town Population: 7211

Regulated Population: 5302

(Populations estimated from 2010 Census)

EPA

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

US EPA Region 1 GIS Center Map #8824, 8/9/2013

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 4th 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 4th 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, Enteroccus 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.

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

- 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

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

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[1] 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;

[1] 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.

- 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;

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;

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

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

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

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

2.0. Non-Numeric Effluent Limitations

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

2.1. Water Quality Based Effluent Limitations

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

2.1.1. Requirement to Meet Water Quality Standards

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

b. If there is a discharge from the MS4 to a waterbody (or its tributaries in some cases) that is subject to an approved TMDL identified in part 2.2.1, the permittee is subject to the requirements of part 2.2.1 and Appendix F of this permit and the permittee shall comply with all applicable schedules and requirements in Appendix F. A permittee's compliance with all applicable requirements and BMP implementation schedules in Appendix F applicable to it will constitute compliance with part 2.1.1.a. of the Permit.

c. If there is a discharge from the MS4 to a waterbody (or its tributaries in some cases) that is water quality limited (see definition in Appendix A) due to nutrients (Total Nitrogen or Total Phosphorus), metals (Cadmium, Copper, Iron, Lead or Zinc), solids (TSS or Turbidity), bacteria/pathogens (E. Coli, Enterococcus or Fecal Coliform), chloride (Chloride) or oil and grease (Petroleum Hydrocarbons or Oil and Grease) and is not subject to an approved TMDL, or the MS4 is located within a municipality listed in part 2.2.2.a.-b., the permittee is subject to the requirements of part 2.2.2 and Appendix H of this permit and the permittee shall comply with all applicable schedules and requirements in Appendix H. A permittee's compliance with all applicable requirements and BMP implementation schedules in Appendix H applicable to it will constitute compliance with part 2.1.1.a. of the Permit.

d. Except where a pollutant of concern in a discharge is subject to the requirements of part 2.2.1 and/or part 2.2.2 of this permit or is the result of an illicit discharge and subject to part 2.3.4 of this Permit, if a pollutant in a discharge from the MS4 is causing or contributing to a violation of applicable water quality criteria[2] 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[3]. 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

[2] 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/

[3] 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

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.

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

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

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
Ca rlisle	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

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

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, Enteroccus 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, Enteroccus or Fecal Coliform), chloride (Chloride), metals (Cadmium, Copper, Iron, Lead or Zinc) or oil and grease (Petroleum Hydrocarbons or Oil and Grease).

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;

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

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	

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, Enteroccus 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.

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.

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.

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

- 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.[4] 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

[4] Likely sewer input indicators are any of the following:
- Olfactory or visual evidence of sewage,
- Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
- Ammonia ≥ 0.5 mg/L, surfactants ≥ 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,

- 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[5]

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[6] 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

[5] 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

[6] Likely sewer input indicators are any of the following:

- Olfactory or visual evidence of sewage,
- Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
- Ammonia ≥ 0.5 mg/L, surfactants ≥ 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[7] 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,

[7] Likely sewer input indicators are any of the following:
- Olfactory or visual evidence of sewage,
- Ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
- Ammonia ≥ 0.5 mg/L, surfactants ≥ 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[8] 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. <u>For all catchments with a minimum of one (1) SVF identified</u>
    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.

[8] 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[9], 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.)

[9] 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[10] 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[11];
c) Recharge groundwater in accordance with Massachusetts Stormwater Handbook Standard 3[12];
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[13];

[10] State approved includes any state in the United States, including, but not limited to, approved guidance by the Commonwealth of Massachusetts
[11] Requirement necessary for Section 401 water quality certification by Massachusetts
[12] Requirement necessary for Section 401 water quality certification by Massachusetts
[13] 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[14] AND 60% of the average annual load of Total Phosphorus (TP) generated from the total post-construction impervious surface area on the site[14]. 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[15] 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

[14] The required removal percentage is not required for each storm,it is the average removal over a year that is required
[15] 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.

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

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:

- 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. 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, Enteroccus 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[16]. 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

[16] Contact MassDEP for guidance on compliance with 314 CMR 4.04

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, Enteroccus 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[17]. 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.

[17] 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:

- 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.

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[1].

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

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

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

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

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

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

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

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

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

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

USFWS Criterion B: In the course of formal or informal consultation with the Fish and Wildlife Service, under section 7 of the ESA, the consultation resulted in either a no jeopardy opinion (formal consultation) or a written concurrence by USFWS on a finding that the stormwater discharges and

discharge related activities are "not likely to adversely affect" listed species or critical habitat (informal consultation).

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

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

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

Step 1 – Determine if you can meet USFWS Criterion A

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

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

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

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

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

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

USFWS that your activities would be "not likely to adversely affect" listed species or critical habitat (for informal consultation)?
AND

4) Do you agree to implement all measures upon which the consultation was conditioned?
5) Do you agree that if, during the course of the permit term, you plan to install a structural BMP not identified in the NOI that you will re-initiate informal or formal consultation with USFWS as necessary?

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

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

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

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

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

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

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

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

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

USFWS Effects Determination Guidance:

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

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

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

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

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

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

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

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

Step 4 - Document Results of the Eligibility Determination

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

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

C. Submittal of Notice of Intent

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

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

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

E. Services Information

United States Fish and Wildlife Service Office

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

U.S. FWS – Region 5
Supervisor

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

Natural Heritage Network

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

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

U.S. Fish and Wildlife IPaC system instructions

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

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

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

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

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

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

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

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

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

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

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 12345-6789

Email: Phone Number: (123) 456-7890

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? *(Part II,III,IV or V, Subpart B.3.(a.) of 2003 permit)* 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?: *(Part II,III,IV or V, Subpart B.3.(b.) of 2003 permit)* Effective Date or Estimated Date of Adoption (MM/DD/YY):

Construction/Erosion and Sediment Control (ESC) Authority Adopted?: *(Part II,III,IV or V, Subpart B.4.(a.) of 2003 permit)* Effective Date or Estimated Date of Adoption (MM/DD/YY):

Post- Construction Stormwater Management Adopted?: *(Part II,III,IV or V, Subpart B.5.(a.) of 2003 permit)* 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
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
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	

		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	
		Chlorophyll-a Dissolved oxygen saturation Escherichia coli Mercury Nitrogen (Total)	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

Identify the Best Management Practices (BMPs) that will be employed to address each of the six Minimum Control Measures (MCMs). For municipalities/organizations whose MS4 discharges into a receiving water with an approved Total Maximum Daily Load (TMDL) and applicable waste lod 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**
		Residents			
		Businesses, Institutions and Commercial Facilities			
		Developers (construction)			
		Industrial Facilities			
		Residents			
		Businesses, Institutions and Commercial Facilities			
		Developers (construction)			
		Industrial Facilities			

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

Part III: Stormwater Management Program Summary

MCM 2: Public Involvement and Participation

BMP Categorization	Brief BMP Description (enter your own text to override the drop down menu)	Responsible Department/ Parties	Additional Description/ Measurable Goal	Beginning Year of BMP implementation
Public Review	SWMP Review			
Public Participation				

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

Part III: Stormwater Management Program Summary

MCM 3: Illicit Discharge Detection and Elimination (IDDE)

BMP Categorization (enter your own text to override the drop down menu)	**BMP Description**	**Responsible Department/Parties** (enter your own text to override the drop down menu)	**Measurable Goal** (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

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

Part III: Stormwater Management Program Summary

MCM 4: Construction Site Stormwater Runoff Control

BMP Categorization (enter your own text to override the drop down menu or entered text)	**BMP Description**	**Responsible Department/ Parties** (enter your own text to override the drop down menu)	**Measurable Goal** (all text can be overwritten)	**Beginning Year of BMP implementation**
Site inspection and enforcement of Erosion and Sediment Control (ESC) measures	Complete written procedures of site inspections and enforcement procedures		Complete by the end of Year 1	
Site plan review	Complete written procedures of site plan review and begin implementation		Complete by the end of Year 1	
Erosion and Sediment Control	Adoption of requirements for construction operators to implement a sediment and erosion control program			
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.			

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

BMP Categorization (enter your own text to override the drop down menu or entered text)	**BMP Description**	**Responsible Department/ Parties** (enter your own text to override the drop down menu)	**Measurable Goal** (all text can be overwritten)	**Beginning Year of BMP implementation**
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

BMP Categorization (enter your own text to override the drop down menu or entered text)	**BMP Description**	**Responsible Department/ Parties** (enter your own text to override the drop down menu)	**Measurable Goal** (all text can be overwritten)	**Beginning Year of BMP implementation**
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 III: Stormwater Management Program Summary

Actions for meeting Total Maximum Daily Load (TMDL) Requirements

Use the drop-down menus to select the best categorization of your BMP and responsible party. If no options are applicable, or more than one, **enter your own text to override drop-down menus.**

Applicable TMDL	**Action Description**	**Responsible Department/ Parties** (enter your own text to override the drop down menu)

Use the drop-down menus to select the Pollutant causing the water quality limitation and enter the waterbody ID(s) experiencing excursions above water quality standards for that pollutant. Choose the action description from the dropdown menu and indicate the responsible party. If no options are applicable, or more than one, **enter your own text to override drop-down menus.**

Actions for meeting Requirements Related to water Quality Limited Waters

Part III: Stormwater Management Program Summary

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

Pollutant	**Waterbody ID(s)**	**Action Description**	**Responsible Department/Parties** (enter your own text to override the drop down menu)

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

Save — Save NOI for your records

EPA Submittal Address:

United States Environmental Protection Agency
5 Post Office Square - Suite 100
Mail Code - OEP06-1
Boston, Massachusetts 02109-3912
ATTN: Newton Tedder

State Submittal Address

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

APPENDIX F

Requirements for Discharges to Impaired Waters with an Approved TMDL

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Attachment 1 – Method To Calculate Baseline Watershed Phosphorus Load For Lake And Pond Phosphorus TMDLs (Applicable To part II Of Appendix F Only) And Method To Calculate Increases in Phosphorus Load due to Development

Attachment 2 – Phosphorus Reduction Credits For Selected Enhanced Non-Structural BMPs

Attachment 3 - Phosphorus Reduction Credits For Selected Structural BMPs

A. Requirements for Discharges to Impaired Waters with an Approved MassDEP In State TMDL

I. Charles River Watershed Phosphorus TMDL Requirements

On October 17, 2007, EPA approved the *Final TMDL for Nutrients in the Lower Charles River Basin* (Lower Charles TMDL)[1] and on June 10, 2011 EPA approved the *Total Maximum Daily Load for Nutrients in the Upper/Middle Charles River* (Upper/Middle Charles TMDL)[2]. 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

[1] Massachusetts Department of Environmental Protection. 2007. *Final TMDL for Nutrients in the Lower Charles River Basin*. CN 301.1

[2] 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	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 0.80 $P_{exp} \leq P_{allow} + (P_{RR}\ X\ 0.80)$	8 years after permit effective date
1-13	Performance Evaluation	9 years after permit effective date
1-14	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 0.75	10 years after permit effective date

	$P_{exp} \leq P_{allow} + (P_{RR}\ X\ 0.75)$	

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[3] and Table F-3[4] list the permittees subject to phosphorus reduction requirements along with the estimated Baseline Phosphorous 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

[3] 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.

[4] 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[5]. 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

[5] 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[6] 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.

Community Annual Stormwater Phosphorus Load Reduction by Permittee, Charles River Watershed

Community	Baseline Phosphorus Load, kg/yr	Stormwater Phosphorus Load Reduction Requirement kg/yr	Allowable Phosphorus Load, kg/yr	Stormwater Percent Reduction in Phosphorus Load (%)
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%

[6] 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.

Community Annual Stormwater Phosphorus Load Reduction by Permittee, Charles River Watershed				
Community	**Baseline Phosphorus Load, kg/yr**	**Stormwater Phosphorus Load Reduction Requirement kg/yr**	**Allowable Phosphorus Load, kg/yr**	**Stormwater Percent Reduction in Phosphorus Load (%)**
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.

Urbanized Area Annual Stormwater Phosphorus Load Reduction by Permittee, Charles River Watershed				
Community	**Baseline Watershed Phosphorus Load, kg/yr**	**Stormwater Phosphorus Load Reduction Requirement, kg/yr**	**Allowable Phosphorus Load, kg/yr**	**Stormwater Percent Reduction in Phosphorus Load (%)**
Arlington	106	57	49	53%
Ashland	67	23	44	34%
Bellingham	801	291	510	36%
Belmont	202	86	116	42%
Brookline	1,635	789	846	48 %
Cambridge	512	263	249	51%
Dedham	805	325	480	40%
Dover	282	54	228	19%
Foxborough	2	0	2	0%
Franklin	2,312	813	1,499	35%
Holliston	1,359	369	990	27%
Hopedale	107	37	70	35%
Hopkinton	280	65	215	23%
Lexington	525	193	332	37%
Lincoln	366	63	303	17%
Medfield	827	267	560	33%
Medway	1,037	305	732	29%
Mendon	10	5	5	50%
Milford	1,486	653	833	44%
Millis	501	159	342	32%
Natick	994	359	635	36%
Needham	1,771	795	976	45%
Newton	3,884	1,941	1,943	50%
Norfolk	1,001	231	770	23%
Somerville	646	331	315	51%
Sherborn	203	38	165	19%
Walpole	159	28	131	18%
Waltham	2,901	1,461	1,440	50%
Watertown	1,127	582	545	52%
Wayland	46	15	31	33%
Wellesley	1,431	661	770	46%

Urbanized Area Annual Stormwater Phosphorus Load Reduction by Permittee, Charles River Watershed				
Community	**Baseline Watershed Phosphorus Load, kg/yr**	**Stormwater Phosphorus Load Reduction Requirement, kg/yr**	**Allowable Phosphorus Load, kg/yr**	**Stormwater Percent Reduction in Phosphorus Load (%)**
Weston	1,174	281	893	24%
Westwood	346	108	238	31%
Wrentham	556	159	397	29%
Mass DCR	396	89	307	22%

Table F-3: Baseline Phosphorus Load, Phosphorus Reduction Requirement, Allowable Phosphorus Load and Percent Reduction in Phosphorus Load from Charles River Watershed. For use when PCP Area is chosen to be only the urbanized area portion of a permittee's jurisdiction within the Charles River Watershed.

b. Phase 2

1) The permittee shall complete the Phase 2 Plan of the PCP 10 years after the permit effective date and fully implement the Phase 2 plan of the PCP as soon as possible but no longer than 15 years after the permit effective date.
2) The Phase 2 plan of the PCP shall be added to the Phase 1 Plan and contain the following elements and has the following required milestones:

Item Number	Phase 2 of the PCP Component and Milestones	Completion Date
2-1	Update Legal analysis	As necessary
2-2	Description of Phase 2 planned nonstructural controls	10 years after permit effective date
2-3	Description of Phase 2 planned structural controls	10 years after permit effective date
2-4	Updated description of Operation and Maintenance Program	10 years after permit effective date
2-5	Phase 2 implementation schedule	10 years after permit effective date
2-6	Estimated cost for implementing Phase 2 of the PCP	10 years after permit effective date

2-7	Complete written Phase 2 Plan	10 years after permit effective date
2-8	Performance Evaluation.	11, and 12 years after permit effective date
2-9	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 $P_{exp} \leq P_{allow} + (P_{RR}\ X\ 0.65)$	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 $P_{exp} \leq P_{allow} + (P_{RR}\ X\ 0.50)$	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[7] 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.

[7] 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[8] 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:

Item Number	Phase 3 of the PCP Component and Milestones	Completion Date
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

[8] See footnote 9

3-8	Performance Evaluation.	16, and 17 years after permit effective date
3-9	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 0.30 $P_{exp} \leq P_{allow} + (P_{RR}\ X\ 0.30)$	18 years after permit effective date
3-10	Performance Evaluation	19 years after permit effective date
3-11	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}) $P_{exp} \leq P_{allow}$	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[9] and tracking increases resulting from development. Phosphorus reductions shall be calculated consistent with Attachment 2 to Appendix F (non-structural BMP

[9] 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[10] 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[11] 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.

Primary Municipality	Waterbody Name	Required Percent Reduction
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%
	Pikes Pond	38%
Dudley	Gore Pond	14%

[10] 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-tmdls.html

[11] 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.

Primary Municipality	Waterbody Name	Required Percent Reduction
	Larner Pond	55%
	New Pond	56%
	Pierpoint Meadow Pond	27%
	Shepherd Pond	25%
	Tobins Pond	62%
	Wallis Pond	54%
Gardner	Hilchey Pond	27%
	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	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}) plus the applicable Phosphorus Reduction Requirement (P_{RR}) multiplied by 0.80 $P_{exp} \leq P_{allow} + (P_{RR}\ X\ 0.80)$	8 years after permit effective date
13	Performance Evaluation	9 years after permit effective date
14	1. Performance Evaluation. 2. Update LPCP 3. 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}) plus the applicable Phosphorus Reduction Requirement (P_{RR}) multiplied by 0.60 $P_{exp} \leq P_{allow} + (P_{RR}\ X\ 0.60)$ OR that the permittee has reduced their phosphorus export rate by 30kg/year (whichever is greater, unless full Phosphorus Reduction Requirement has been met)	10years after permit effective date
15	Performance Evaluation	11 and 12 years after permit effective date
16	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	13years after permit effective date

	Phosphorus Load(P_{allow}) plus the applicable Phosphorus Reduction Requirement (P_{RR}) multiplied by 0.30 $P_{exp} \leq P_{allow} + (P_{RR}\ X\ 0.30)$	
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}) $P_{exp} \leq P_{allow}$	15years 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[12] 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[13]. Phosphorus load increases resulting from development shall be calculated consistent with Attachment 1 to Appendix F. Phosphorus

[12] 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

[13] 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. Equation2 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.

$$P_{exp}\left(\frac{mass}{yr}\right) = P_{base}\left(\frac{mass}{yr}\right) - \left(P_{Sred}\left(\frac{mass}{yr}\right) + P_{NSred}\left(\frac{mass}{yr}\right)\right) + P_{DEVinc}\left(\frac{mass}{yr}\right)$$

Equation 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.[14] 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.

Primary Municipality	Segment ID	Waterbody Name	Indicator Organism
Abington	MA62-09	Beaver Brook	Escherichia Coli (E. Coli)
Abington	MA62-33	Shumatuscacant 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

[14] 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	Shumatuscacant 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	Popponesset 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	Shumatuscacant 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.[15] The following measuress 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.

[15] 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).

Municipality	Waterbody Name
Barnstable	Centerville River
Barnstable	Popponesset Bay
Barnstable	Shoestring Bay
Barnstable	Cotuit Bay
Barnstable	North Bay
Barnstable	Prince Cove
Barnstable	West Bay
Barnstable	Hyannis Inner Harbor
Barnstable	Lewis Bay
Bourne	Phinneys Harbor
Chatham	Crows Pond
Chatham	Bucks Creek
Chatham	Harding Beach Pond
Chatham	Mill Creek
Chatham	Mill Pond
Chatham	Oyster Pond
Chatham	Oyster Pond River
Chatham	Stage Harbor
Chatham	Taylors 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

Municipality	Waterbody Name
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*[16]. 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

[16] 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).

Municipality
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[17], 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

[17] 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	

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 Kikemuit River, Kickemuit River, Ten Mile River, Central Pond, Turner Reservoir, Lower Ten Mile River, and Omega Pond TMDLs[18]. 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

[18] 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.

Municipality	Receiving Water	TMDL Name
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 Kikemuit River, Ten Mile River, Lower Ten Mile River and Omega Pond TMDLs[19] 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.

[19] See http://www.dem.ri.gov/programs/benviron/water/quality/rest/reports.htm for all RI TMDL documents. (retrieved 6/30/2014)

Municipality	Receiving Water	TMDL Name
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 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.[20] 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

[20] 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.

Municipality	Receiving Water	TMDL Name
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 $_{IND}$) + (Baseline P Load $_{MDR}$) + (Baseline P Load $_{FOR}$)

Where:
Baseline P Load $_{IND}$ = (TA_{IND}) x (PLER for industrial use (Table 1-1))
= 11.0 acre x 1.27 lbs/acre/year
= 14.0 lbs P/year

Baseline P Load $_{MDR}$ = (TA_{MDR}) x (PLER for medium density residential (Table 1-1))
= 3.0 acre x 0.49 lbs/acre/year
= 1.5 lbs P/year

Baseline P Load $_{FOR}$ = (TA_{FOR}) x (PLER for forest (Table 1-1))
= 4.0 acre x 0.12 lbs/acre/year
= 0.5 lbs P/year

Baseline Phosphorus Load = 14.0 lbs P/year + 1.5 lbs P/year + 0.5 lbs P/year
= **16.0 lbs P/year**

(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_{DEVinc}): 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_{DEV}) 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_{DEVinc}) 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_{DEVinc} 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:

Baseline Load = (Baseline P Load $_{IND}$) +
(Baseline P Load $_{MDR}$) +
(Baseline P Load $_{FOR}$)
= **16.0 lb/year** (determined in Example 1-1)

P_{DEV} = $(TA_{IND} \times PLER_{IND})+(IA_{HDR} \times PLER_{HDR})+(PA_{MDR} \times PLER_{MDR})+(PA_{FOR} \times PLER_{For})$
= (11.0 acres * 1.27) + (2.0 acres * 2.32) + (1.5 acres * 0.21) + (3.5 * 0.12)
= **19.0 lbs P/year**

$\mathbf{P_{DEVinc}}$ = P_{DEV} – Baseline Load
= 19.0 – 16.0
= **3.0 lbs/year**

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

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

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:

- 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.
- 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.
- Impervious surfaces within the forest land use category are typically roadways adjacent to forested pervious areas.

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:

$$Credit_{sweeping} = IA_{swept} \times PLE_{IC\text{-}land\ use} \times PRF_{sweeping} \times AF \qquad \textbf{(Equation 2-1)}$$

Where:

$Credit_{sweeping}$ = Amount of phosphorus load removed by enhanced sweeping program (lb/year)

IA_{swept} = Area of impervious surface that is swept under the enhanced sweeping program (acres)

$PLE_{IC\text{-}land\ use}$ = Phosphorus Load Export Rate for impervious cover and specified land use (lb/acre/yr) (see Table 2-1)

$PRF_{sweeping}$ = Phosphorus Reduction Factor for sweeping based on sweeper type and frequency (see Table 2-3).

AF = Annual Frequency of sweeping. For example, if sweeping does not occur in Dec/Jan/Feb, the AF would be 9 mo./12 mo. = 0.75. For year-round sweeping, AF=1.0[1]

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

Table 2-3: Phosphorus reduction efficiency factors ($PRF_{sweeping}$) for sweeping impervious areas

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

[1]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).

[2] 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 $_{sweeping}$): 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_{swept}	= 20.3 acres
$PLE_{IC\text{-}HDR}$	= 2.32 lb/acre/yr (from Table 2-1)
$PRF_{sweeping}$	= 0.08 (from Table 2-3)
AF	= (9 months / 12 months) = 0.75

Substitution into equation 2-1 yields a $Credit_{sweeping}$ of 3.2 pounds of phosphorus removed per year.

$Credit_{sweeping}$ = IA_{swept} x $PLE_{land\ use}$ x $PRF_{sweeping}$ x AF
= 20.3 acres x 2.32 lbs/acre/yr x 0.08 x 0.75
= 2.8 lbs/yr

(2) Catch Basin Cleaning: The permittee may earn a phosphorus reduction credit, $Credit_{CB}$, 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:

$$Credit_{CB} = IA_{CB} \times PLE_{IC\text{-}land\ use} \times PRF_{CB} \quad \textbf{(Equation 2-2)}$$

Where:

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

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

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

Example 2-2: Calculation for catch basin cleaning credit (Credit $_{CB}$):
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_{CB}	= 15.3 acre
$PLE_{IC\text{-}MDR}$	= 1.96 lbs/acre/yr (from Table 2-1)
PRF_{CB}	= 0.02 (from Table 2-4)

Substitution into equation 2-2 yields a Credit $_{CB}$ of 0.6 pounds of phosphorus removed per year:

Credit $_{CB}$	= IA_{CB} x $PLE_{IC\text{-}MDR}$ x PRF_{CB}
	= 15.3 acre x 1.96 lbs/acre/yr x 0.02
	= 0.6 lbs/yr

(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 $_{leaf\ litter}$), 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 $_{leaf\ litter}$ shall be determined by the following equation:

$$Credit_{leaf\ litter} = (Watershed\ Area) \times (PLE_{IC\text{-}land\ use}) \times (0.05) \qquad \textbf{(Equation 2-3)}$$

Where:

Credit $_{leaf\ litter}$	= 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
$PLE_{IC\text{-}land\ use}$	= 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 $_{\text{leaf litter}}$): 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 $_{\text{leaf litter}}$ is:

Watershed Area = 12.5 acres; and
PLE $_{\text{IC-commercial}}$ = 1.78 lbs/acre/yr (from Table 2-1)

Substitution into equation 2-4 yields a Credit $_{\text{leaf litter}}$ of 1.1 pounds of phosphorus removed per year:

Credit $_{\text{leaf litter}}$ = (12.5 acre) x (1.78 lbs/acre/yr) x (0.05)
= 1.1 lbs/yr

The permittee also may earn a phosphorus reduction credit for enhanced sweeping of roads and parking lot areas (i.e., Credit $_{\text{sweeping}}$) for the three months of use. Using equation 2-1, Credit $_{\text{sweeping}}$ is:

Credit $_{\text{sweeping}}$ = IA $_{\text{swept}}$ x PLE $_{\text{IC-land use}}$ x PRF $_{\text{sweeping}}$ x AF **(Equation 2-1)**
IA $_{\text{swept}}$ = 12.5 acre
PLE $_{\text{IC-commercial}}$ = 1.78 lbs/acre/yr (from Table 2-1)
PRF $_{\text{sweeping}}$ = 0.05 (from Table 2-3)
AF = 3 mo./12 mo. = 0.25

Substitution into equation 2-1 yields a Credit $_{\text{sweeping}}$ of 0.28 pounds of phosphorus removed per year.

Credit $_{\text{sweeping}}$ = IA $_{\text{swept}}$ x PLE $_{\text{IC-commercial}}$ x PRF $_{\text{sweeping}}$ x AF
= 12.5 acre x 1.78 lbs/acre/yr x 0.05 x 0.25
= 0.3 lbs/yr

ATTACHMENT 3 TO APPENDIX F

Methods to Calculate Phosphorus Load Reductions for Structural Stormwater Best Management Practices

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Methods to Calculate Phosphorus Load Reductions for Structural Stormwater Best Management Practices in the Watershed

This attachment provides methods to determine design storage volume capacities and to calculate phosphorus load reductions for the following structural Best Management Practices (structural BMPs) for a Watershed:

1) Infiltration Trench;
2) Infiltration Basin or other surface infiltration practice;
3) Bio-filtration Practice;
4) Gravel Wetland System;
5) Porous Pavement;
6) Wet Pond or wet detention basin;
7) Dry Pond or detention basin; and
8) Dry Water Quality Swale/ Grass Swale.

Additionally, this attachment provides methods to design and quantify associated phosphorus load reduction credits for the following four types of semi-structural/non-structural BMPs

9) Impervious Area Disconnection through Storage (e.g., rain barrels, cisterns, etc);
10) Impervious Area Disconnection;
11) Conversions of Impervious Area to Permeable Pervious Area; and
12) Soil Amendments to Enhance Permeability of Pervious Areas.

Methods and examples are provided in this Attachment to calculate phosphorus load reductions for structural BMPs for the four following purposes:

1) To determine the design volume of a structural BMP to achieve a known phosphorus load reduction target when the contributing drainage area is 100% impervious;
2) To determine the phosphorus load reduction for a structural BMP with a known design volume when the contributing drainage area is 100% impervious;
3) To determine the design volume of a structural BMP to achieve a known phosphorus load reduction target when the contributing drainage area has impervious and pervious surfaces; and
4) To determine the phosphorus load reduction for a structural BMP with a known design volume when the contributing drainage area has impervious and pervious surfaces.

Examples are also provided for estimating phosphorus load reductions associated with the four semi-structural/non-structural BMPs.

Also, this attachment provides the methodology for calculating the annual stormwater phosphorus load that will be delivered to BMPs for treatment (BMP Load) and to be used for quantifying phosphorus load reduction credits. The methods and annual phosphorus export load rates presented in this attachment are for the purpose of counting load reductions for various BMPs treating storm water runoff from varying site conditions (i.e., impervious or pervious surfaces) and different land uses (e.g. commercial and industrial). The estimates of annual phosphorus load and load reductions by BMPs are to demonstrate compliance with the permittee's Phosphorus Reduction Requirement under the permit.

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 lessor storage volume within the void spaces of a coarse filter media, then the physical storage volume capacity used to determine the long-term cumulative phosphorus removal efficiency from the infiltration basin performance curves would be equal to the sum of the surface storage volume and the void space storage volume. General design specifications for various surface infiltration systems are provided in the most recent version of *the Massachusetts Stormwater Handbook, Volume 2/Chapter2* (http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/v2c2.pdf).

Bio-filtration is a practice that provides temporary storage of runoff for filtering through an engineered soil media. The storage capacity is typically made of void spaces in the filter media and temporary ponding at the surface of the practice. Once the runoff has passed through the filter media it is collected by an under-drain pipe for discharge. The performance curve for this control practice assumes zero infiltration. If a filtration system has subsurface soils that are suitable for infiltration, then user should use the either performance curves for the infiltration trench or the infiltration basin depending on the predominance of storage volume made up by free standing storage or void space storage. Depending on the design of the filter media manufactured or packaged bio-filter systems such as tree box filters may be suitable for using the bio-filtration performance results. Design specifications for bio-filtration systems are provided in the most recent version of *the Massachusetts Stormwater Handbook, Volume 2/Chapter2* (http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/v2c2.pdf).

Gravel Wetland performance results should be used for practices that have been designed in accordance or share similar features with the design specifications for gravel wetland systems provided in the most recent version of *the Massachusetts Stormwater Handbook, Volume 2/Chapter2* (http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/v2c2.pdf).

Porous Pavement performance results represent systems with an impermeable under-liner and an under-drain. *If porous pavement systems do not have an impermeable under-liner so that filtered runoff can infiltrate into sub-soils then the performance results for an infiltration trench may be used for these systems.* Design specifications for porous pavement systems are provided in the most recent version of *the Massachusetts Stormwater Handbook, Volume 2/Chapter2* (http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/v2c2.pdf).

Extended Dry Detention Pond performance results should only be used for practices that have been designed in accordance with the design specifications for extended dry detention ponds provided in the most recent version of *the Massachusetts Stormwater Handbook, Volume 2/Chapter2* (http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/v2c2.pdf)

Dry Water Quality Swale/ Grass Swale performance results should only be used for practices that have been designed in accordance with the design specifications for a water quality dry swale provided in the most recent version of *the Massachusetts Stormwater Handbook, Volume 2/Chapter2* (http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/v2c2.pdf)

Impervious Area Disconnection using Storage (e.g., rain barrels, cistern, etc) performance results are for collecting runoff volumes from impervious areas such as roof tops, providing temporary storage of runoff volume using rain barrels, cisterns or other storage containers, and discharging stored volume to adjacent permeable pervious surfaces over an extended period of time.

Impervious Area Disconnection performance results are for diverting runoff volumes from impervious areas such as roadways, parking lots and roof tops, and discharging it to adjacent vegetated permeable surfaces that are of sufficient size with adequate soils to receive the runoff without causing negative impacts to adjacent down-gradient properties. Careful consideration must be given to the ratio of impervious area to the pervious area that will receive the discharge. Also, devices such as level spreaders to disperse the discharge and provide sheet flow should be employed whenever needed to increase recharge and avoid flow concentration and short circuiting through the pervious area. Soil testing is needed to classify the permeability of the receiving pervious area in terms of HSG.

Conversion of Impervious Area to Permeable Pervious Area phosphorus load reduction credits are for replacing existing impervious surfaces (such as traditional pavements and buildings with roof tops) with permeable surfaces. To be eligible for credit, it is essential that the area previously covered with impervious surface be restored to provide natural or enhanced hydrologic functioning so that the surface is permeable. Sub-soils beneath pavements are typically highly compacted and will require reworking to loosen the soil and the possible addition of soil amendments to restore permeability. Soil testing is needed to classify the permeability (in terms of HSG) of the restored pervious area.

Soil Amendments to Increase Permeability of Pervious Areas performance results are for the practice of improving the permeability of pervious areas through incorporation of soil amendments, tilling and establishing dense vegetation. This practice may be used to compliment 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:

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.

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:

BMP Subarea ID	Land Use Category	Cover Type	Area (acres)	P export rate (lb/acre/yr)*
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:

BMP Load $= (IA_{Ind} \times PLER_{Ind}) + (PA_{Ind} \times PLER_{Ind}) + (PA_{FOREST} \times PLER_{For})$
$= (10.13 \times 1.78) + (1.85 \times 0.21) + (0.89 \times 0.12)$
= 18.53 lbs P/year

Table 3-1: Average annual distinct phosphorus load (P Load) export rates for use in estimating phosphorus load reduction credits the MA MS4 Permit

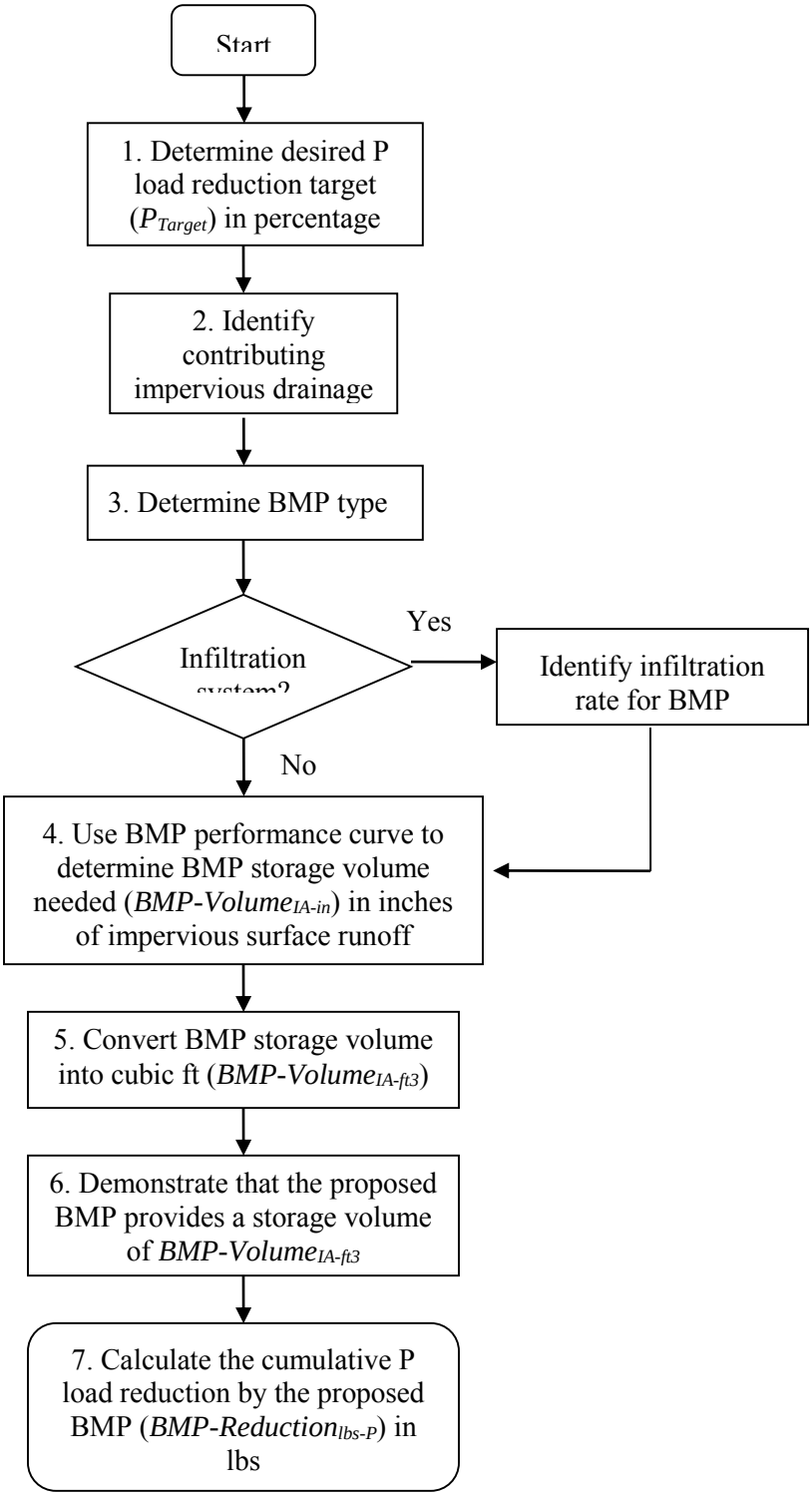
Phosphorus Source Category by Land Use	Land Surface Cover	P Load Export Rate, lbs/acre/year	P Load Export Rate, kg/ha/yr
Commercial (Com) and Industrial (Ind)	Directly connected impervious	1.78	2.0
	Pervious	See* DevPERV	See* DevPERV
Multi-Family (MFR) and High-Density Residential (HDR)	Directly connected 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

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:

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_{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 $_{IA\text{-}in}$), 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 $_{IA\text{-}ft^3}$) using BMP-Volume $_{IA\text{-}in}$ determined from step 4 and equation 3-1:

BMP-Volume $_{IA\text{-}ft^3}$ = IA (acre) x BMP-Volume $_{IA\text{-}in}$ x 3630 ft^3/ac-in **(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 $_{IA\text{-}ft^3}$, determined from step 5 will be provided to achieve the P_{Target}; and

7) Calculate the cumulative phosphorus load reduction in pounds of phosphorus (BMP-Reduction $_{lbs\text{-}P}$) for the structural BMP using the BMP Load (as calculated from the procedure in Attachment 1 to Appendix F) and P_{target} by using equation 3-2:

BMP-Reduction $_{lbs\text{-}P}$ = BMP Load x (P_{target} /100) **(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 $_{IA\text{-}ft^3}$); and

B) Cumulative phosphorus reduction in pounds that would be accomplished by the BMP (BMP-Reduction $_{lbs\text{-}P}$)

Solution:

1) Contributing impervious drainages area (IA) = 2.57 acres

BMP type is a surface infiltration practice (i.e., basin) with an infiltration rate (IR) of 0.39 in/hr

Solution continued:

3) Phosphorus load reduction target (P_{target}) = 70%

4) The performance curve for the infiltration basin (i.e., surface infiltration practice), Figure 3-8, IR = 0.27 in/hr is used to determine the design storage volume of the BMP (BMP-Volume $_{IA\text{-}in}$) needed to treat runoff from the contributing IA and achieve a P_{target} = 70%. The curve for an infiltration rate of 0.27 in/hr is chosen because 0.27 in/hr is the nearest simulated IR that is less than the field measured IR of 0.39 in/hr. From Figure 3-8, the BMP-Volume $_{IA\text{-}in}$ for a P_{target} = 70% is 0.36 in.

5) The BMP-Volume $_{IA\text{-}in}$ is converted to cubic feet (BMP-Volume $_{IA\text{-}ft^3}$) using Equation 3-1:

BMP-Volume $_{IA\text{-}ft^3}$ = IA (acre) x BMP-Volume $_{IA\text{-}in}$ x 3,630 ft^3/acre-in
BMP-Volume $_{IA\text{-}ft^3}$ = 2.57 acre x 0.36 in x 3,630 ft^3/acre-in
= **3,359 ft^3**

6) A narrow trapezoidal infiltration basin with the following characteristics is proposed to achieve the P_{Target} of 70%:

Length (ft)	Design Depth (ft)	Side Slopes	Bottom area (ft^2)	Pond surface area (ft^2)	Design Storage Volume (ft^3)
355	1.25	3:1	1,387	4,059	3,404

The volume of the proposed infiltration practice, 3,404 ft^3, exceeds the BMP-Volume $_{IA\text{-}ft^3}$ needed, 3,359 ft^3 and is sufficient to achieve the P Target of 70%.

7) The cumulative phosphorus load reduction in pounds of phosphorus for the infiltration practice (BMP-Reduction $_{lbs\text{-}P}$) is calculated using Equation 3-2. The BMP Load is first determined using the method described above.

BMP Load = IA x impervious cover phosphorus export loading rate for commercial use (see Table 3-1)
= 2.57 acres x 1.78 lbs/acre/yr
= 4.58 lbs/yr

BMP-Reduction $_{lbs\text{-}P}$ = BMP Load x (P_{target} /100)
BMP-Reduction $_{lbs\text{-}P}$ = 4.58 lbs/yr x (70/100)
= **3.21 lbs/yr**

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

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 $_{IA\text{-}in}$) needed to treat runoff from the contributing IA and achieve a P_{target} = 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_{target} 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 ($PR_{IR=0.27}$)	% Phosphorus Load Reduction IR = 0.52 in/hr ($PR_{IR=0.52}$)	Interpolated % Phosphorus Load Reduction IR = 0.39 in/hr ($PR_{IR=0.39}$) **$PR_{IR=0.39}$= IAF($PR_{IR=0.52}$ – $PR_{IR=0.27}$) + $PR_{IR=0.27}$**
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 $_{IA\text{-}in}$ for $PR_{IR=0.39}$ of 70% is between 0.3 and 0.4 inches and can be determined by interpolation:

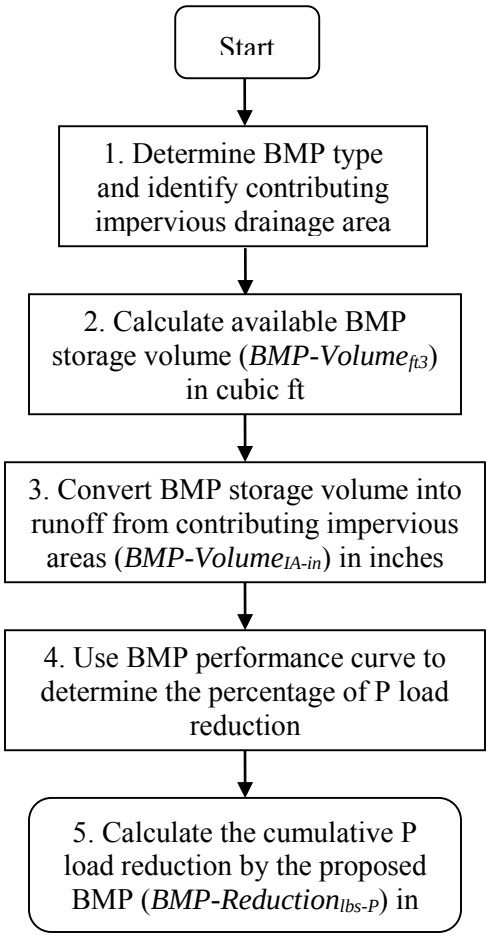
$$\text{BMP-Volume}_{IA\text{-}in} = (70\% - 65\%)/ (75\% - 65\%) \times (0.4 \text{ in} – 0.3 \text{ in}) + 0.3 \text{ in}$$
$$= 0.35 \text{ inches}$$

5 alternative) Convert the resulting BMP-Volume $_{IA\text{-}in}$ to cubic feet (BMP-Volume $_{IA\text{-}ft^3}$) using equation 3-1:

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

(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.



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 (ft^3) of the structural BMP (BMP-Volume $_{ft^3}$) using the BMP dimensions and design specifications (e.g., maximum storage depth, filter media porosity);

3) Convert BMP-Volume $_{ft^3}$ into inches of runoff from the contributing impervious area (BMP-Volume $_{IA\text{-}in}$) using equation 3-3:

BMP-Volume $_{IA\text{-}in}$ = BMP-Volume $_{ft^3}$/ IA (acre) x 12 in/ft x 1 acre/43560 ft^2 **(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 $_{IA\text{-}in}$ calculated in step 3; and

5) Calculate the cumulative phosphorus load reduction in pounds of phosphorus for the structural BMP (BMP Reduction $_{lbs-P}$) 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:

BMP Reduction $_{lbs-P}$ = BMP Load x (BMP Reduction $_{\%-P}$/100) **(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^2 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^2
	Vegetative parameter[a]	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

[a] Refers to the percentage of surface covered with vegetation

Determine the:

A) Percent phosphorus load reduction (BMP Reduction $_{\%-P}$) 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 $_{lbs-P}$)

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^3) of the bio-filtraton system (BMP-Volume $_{BMP-ft^3}$) is determined using the surface area of the system, depth of ponding, and the porosity of the filter media:

BMP-Volume $_{BMP-ft^3}$ = (surface area x pond maximum depth) + ((soil mix depth + gravel layer depth)/12 in/ft) x surface area x gravel layer porosity)
= (1,200 ft^2 x 0.5 ft) + ((38/12) x 1,200 ft^2 x 0.4)
= 2,120 ft^3

Solution continued:

3) The available storage volume capacity of the bio-filtration system in inches of runoff from the contributing impervious area (BMP-Volume $_{IA\text{-}in}$) is calculated using equation 3-3:

BMP-Volume $_{IA\text{-}in}$ = (BMP-Volume $_{ft}^3$/ IA (acre) x 12 in/ft x 1 acre/43560 ft^2
BMP-Volume $_{IA\text{-}in}$ = (2120 ft^3/1.49 acre) x 12 in/ft x 1 acre/43560 ft^2
= 0.39 in

4) Using the bio-filtration performance curve shown in Figure 3-13, a **51%** phosphorus load reduction (BMP Reduction %-P) is determined for a bio-filtration system sized for 0.39 in of runoff from 1.49 acres of impervious area; and

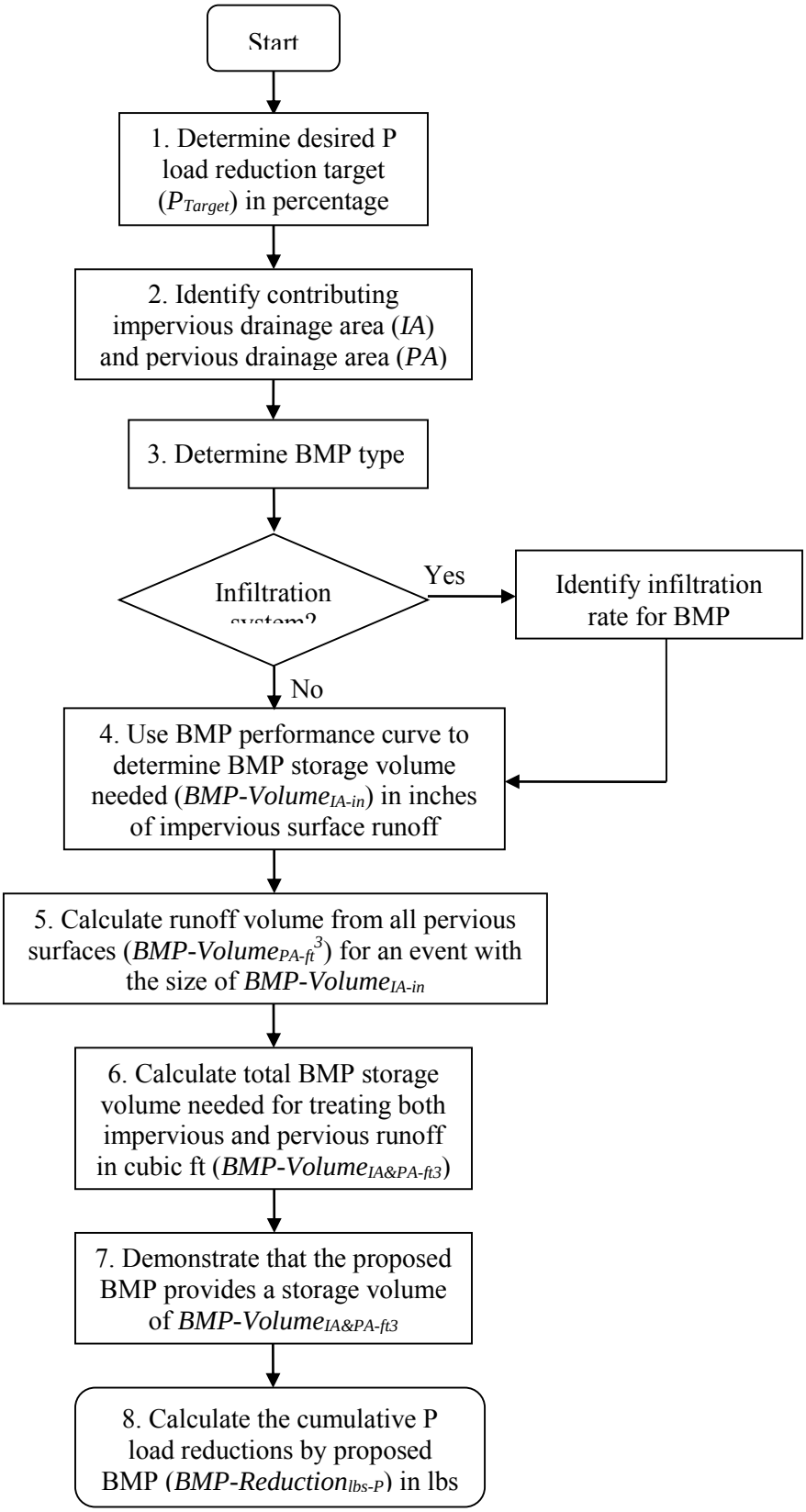
5) Calculate the cumulative phosphorus load reduction in pounds of phosphorus for the bio-filtration system (BMP Reduction $_{lbs\text{-}P}$) using the BMP Load as calculated from the procedure described above and the BMP Reduction $_{\%\text{-}P}$ determined in step 4 by using equation 3-4. First, the BMP Load is determined as specified above:

BMP Load = IA x impervious cover phosphorus export loading rate for HDR (see Table 3-1) = 1.49 acres x 2.32 lbs/acre/yr
= 3.46 lbs/yr

BMP Reduction $_{lbs\text{-}P}$ = BMP Load x (BMP Reduction $_{\%\text{-}P}$/100)
BMP Reduction $_{lbs\text{-}P}$ = 3.46 lbs/yr x (51/100)
= **1.76 lbs/yr**

(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.


Start
1. Determine desired P load reduction target (P_{Target}) in percentage
2. Identify contributing impervious drainage area (*IA*) and pervious drainage area (*PA*)
3. Determine BMP type
Infiltration system?
Yes
Identify infiltration rate for BMP
No
4. Use BMP performance curve to determine BMP storage volume needed (*BMP-Volume*$_{IA\text{-}in}$) in inches of impervious surface runoff
5. Calculate runoff volume from all pervious surfaces (*BMP-Volume*$_{PA\text{-}ft}{}^{3}$) for an event with the size of *BMP-Volume*$_{IA\text{-}in}$
6. Calculate total BMP storage volume needed for treating both impervious and pervious runoff in cubic ft (*BMP-Volume*$_{IA\&PA\text{-}ft3}$)
7. Demonstrate that the proposed BMP provides a storage volume of *BMP-Volume*$_{IA\&PA\text{-}ft3}$
8. Calculate the cumulative P load reductions by proposed BMP (*BMP-Reduction*$_{lbs\text{-}P}$) in lbs

Flow Chart 3: Method to determine the design storage volume of a BMP to reach a known P load reduction when both impervious and pervious drainage areas are present.

1) Determine the desired cumulative phosphorus load reduction target (P_{target}) in percentage for the structural BMP;
2) Characterize the contributing drainage area to the structural BMP by identifying the following information for the impervious and pervious surfaces:
   Impervious area (IA) - Area (acre) and land use (e.g., commercial)

   Pervious area (PA) – Area (acre) and runoff depths based on hydrologic soil group (HSG) and rainfall depth. Table 3-3 provides values of runoff depth from pervious areas for various rainfall depths and HSGs. Soils are assigned to an HSG on the basis of their permeability. HSG A is the most permeable, and HSG D is the least permeable. HSG categories for pervious areas in the drainage area shall be estimated by consulting local soil surveys prepared by the National Resource Conservation Service (NRCS) or by a storm water professional evaluating soil testing results from the drainage area. If the HSG condition is not known, a HSG D soil condition should be assumed.

Table 3- 3: Developed Land Pervious Area Runoff Depths based on Precipitation depth and Hydrological Soil Groups (HSGs)

Developed Land Pervious Area Runoff Depths based on Precipitation depth and Hydrological Soil Groups					
Rainfall Depth, Inches	Runoff Depth, inches				
	Pervious HSG A	Pervious HSG B	Pervious HSG C	Pervious HSG C/D	Pervious HSG D
0.10	0.00	0.00	0.00	0.00	0.00
0.20	0.00	0.00	0.01	0.02	0.02
0.40	0.00	0.00	0.03	0.05	0.06
0.50	0.00	0.01	0.05	0.07	0.09
0.60	0.01	0.02	0.06	0.09	0.11
0.80	0.02	0.03	0.09	0.13	0.16
1.00	0.03	0.04	0.12	0.17	0.21
1.20	0.04	0.05	0.14	0.27	0.39
1.50	0.08	0.11	0.39	0.55	0.72
2.00	0.14	0.22	0.69	0.89	1.08

Notes: Runoff depths derived from combination of volumetric runoff coefficients from Table 5 of *Small Storm Hydrology and Why it is Important for the Design of Stormwater Control Practices*, (Pitt, 1999), and using the Stormwater Management Model (SWMM) in continuous model mode for hourly precipitation data for Boston, MA, 1998-2002.

3) Determine the structural BMP type (e.g., infiltration trench, gravel wetland). For infiltration systems, determine the appropriate infiltration rate for the location of the BMP in the Watershed;
4) Using the cumulative phosphorus removal performance curve for the selected structural BMP, determine the storage volume capacity of the BMP in inches needed to treat runoff from the contributing impervious area (BMP-Volume $_{IA\text{-}in}$);

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

   BMP-Volume $_{PA\ ft^3} = \sum$ (PA x (runoff depth) x 3,630 ft^3/acre-in) $_{(PA1,\ldots\ PAn)}$ **(Equation 3-5)**

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

   BMP-Volume $_{IA\&PA\text{-}ft^3}$ = BMP Volume $_{PA\text{-}ft^3}$ + (BMP Volume $_{IA\text{-}in}$ x IA (acre) x 3,630 ft^3/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 $_{IA\&PA\text{-}ft^3}$, will be provided to achieve the P $_{Target}$; and

8) Calculate the cumulative phosphorus load reduction in pounds of phosphorus (BMP-Reduction $_{lbs\text{-}P}$) for the structural BMP using the BMP Load (as calculated from the procedure in Attachment 1 to Appendix F) and the P $_{target}$ by using equation 3-2:

BMP-Reduction $_{lbs\text{-}P}$ = BMP Load x (P $_{target}$ /100) **(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 $_{Target}$) 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 $_{IA\&PA\text{-}ft^3}$); and
B) Cumulative phosphorus reduction in pounds that would be accomplished by the BMP (BMP-Reduction $_{lbs\text{-}P}$)

Example 3-3 continued:
Solution:

1) The BMP type is gravel wetland system.

2) The phosphorus load reduction target (P_{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 $_{IA\text{-}in}$) is 0.71 in;

Using equation 3-5 and the pervious runoff depth information from Table 3-3, the volume of runoff from the contributing pervious drainage area in cubic feet (BMP Volume $_{PA-ft^3}$) for a rainfall size equal to 0.71 in is summarized in Table Example 3-3-A. As indicated from Table 3-3, the runoff depth for a rainfall size equal to 0.71 inches is between 0.6 and 0.8 inches and can be determined by interpolation (example shown for runoff depth of HSG C):

Runoff depth (HSG C) = (0.71 – 0.6)/(0.8 – 0.6) x (0.09 in – 0.06 in) + 0.06 in
= 0.07 inches

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^3/acre-in (ft^3)
PA1	Grass	2.00	C	0.07	0.14	508
PA2	Grass	0.50	B	0.01	0.0	0.0
PA3	Woods	1.00	B	0.01	0.0	0.0
Total	-----	**3.50**	-----	-----	**0.14**	**508**

4) Using equation 3-6, determine the BMP storage volume in cubic feet (BMP-Volume $_{IA\&PA\text{-}ft^3}$) needed to treat 0.71 inches of runoff from the contributing impervious area (IA) and the runoff of 0.14 acre-in from the contributing pervious areas, determined in step 5 is:

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

BMP Volume$_{IA\&PA\text{-}ft^3}$ = (508 ft^3+ (0.71 in x 4.00 acre)) x 3,630 ft^3/acre-in
= 10,817 ft^3

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^2)	Volume (ft^3)
Sediment Forebay	**10% of Treatment Volume**			
Pond area	**----**	1.33	896	1,192
Wetland Cell #1	**45% of Treatment Volume**	----------	----------	----------
Pond area	**----**	2.00	1,914	3,828
Gravel layer	porosity = 0.4	2.00	1,914	1,531
Wetland Cell #2	**45% of Treatment Volume**	----------	----------	----------
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^3. This volume is greater than 11,834 ft^3 ((BMP-Volume $_{IA\&PA\text{-}ft^3}$), calculated in step 6) and is therefore sufficient to achieve a P_{Target} of 55%.

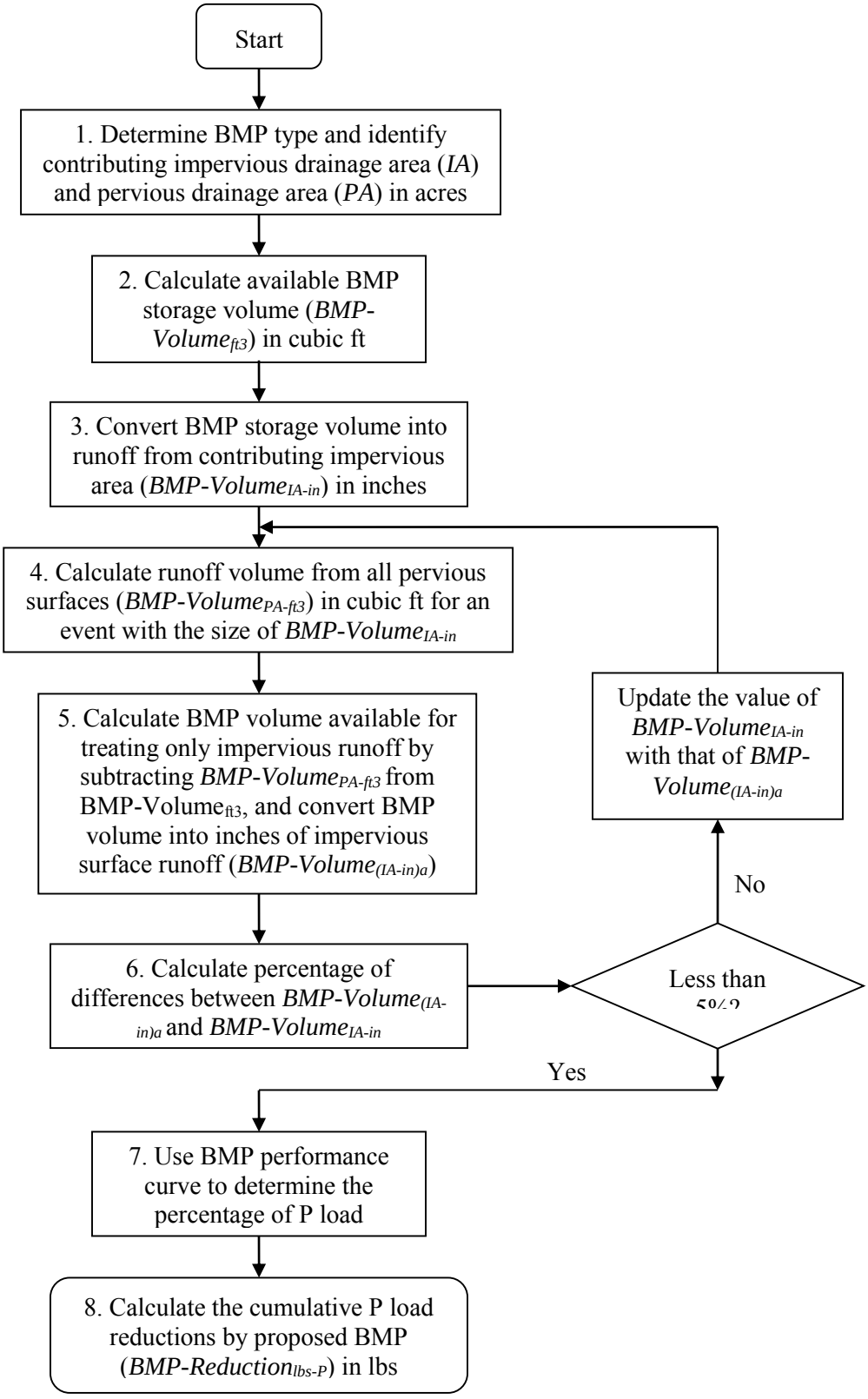
6) The cumulative phosphorus load reduction in pounds of phosphorus (BMP-Reduction $_{lbs\text{-}P}$) for the proposed gravel wetland system is calculated by using equation 3-2 with the BMP Load and the P_{target} = 55%.

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

Using Table 3-1, the BMP Load is calculated:
BMP Load = (IA x PLER $_{HDR}$) + (PA lawn $_{HSG\,B}$ x PLER $_{HSG\,B}$) + (PA lawn $_{HSG\,C}$ x PLER $_{HSG\,C}$) +(PA forest x PA PLER $_{For}$)
= (4.00 acre x 2.32 lbs/acre/yr) + (0.50 acres x 0.12 lbs/acre/yr) + (1.00 acre x 0.21 lbs/acre/yr) + (1.00 acres x 0.13)
= 9.68 lbs/yr
BMP-Reduction $_{lbs\text{-}P}$ = BMP Load x (P_{target} /100)
BMP-Reduction $_{lbs\text{-}P}$ = 9.68 lbs/yr x 55/100
= **5.32 lbs/yr**

(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.


Start
1. Determine BMP type and identify contributing impervious drainage area (*IA*) and pervious drainage area (*PA*) in acres
2. Calculate available BMP storage volume (*BMP-Volume*$_{ft3}$) in cubic ft
3. Convert BMP storage volume into runoff from contributing impervious area (*BMP-Volume*$_{IA\text{-}in}$) in inches
4. Calculate runoff volume from all pervious surfaces (*BMP-Volume*$_{PA\text{-}ft3}$) in cubic ft for an event with the size of *BMP-Volume*$_{IA\text{-}in}$
5. Calculate BMP volume available for treating only impervious runoff by subtracting *BMP-Volume*$_{PA\text{-}ft3}$ from BMP-Volume$_{ft3}$, and convert BMP volume into inches of impervious surface runoff (*BMP-Volume*$_{(IA\text{-}in)a}$)
6. Calculate percentage of differences between *BMP-Volume*$_{(IA\text{-}in)a}$ and *BMP-Volume*$_{IA\text{-}in}$
Less than
No
Update the value of *BMP-Volume*$_{IA\text{-}in}$ with that of *BMP-Volume*$_{(IA\text{-}in)a}$
Yes
7. Use BMP performance curve to determine the percentage of P load
8. Calculate the cumulative P load reductions by proposed BMP (*BMP-Reduction*$_{lbs\text{-}P}$) in lbs

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^3) of the structural BMP (BMP-Volume $_{ft^3}$) 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 $_{ft^3}$) 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 imperious area for the unknown rainfall depth of *i* inches (see equation 3-6b):

$$\text{BMP-Volume}_{ft^3} = \text{BMP-Volume}_{(IA\text{-}ft^3)i} + \text{BMP-Volume}_{(PA\text{-}ft^3)i} \quad \textbf{(Equation 3-6a)}$$

Where:

BMP-Volume $_{ft^3}$= the available storage volume of the BMP;

BMP-Volume $_{(IA\text{-}ft^3)i}$ = 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 $_{(PA\text{-}ft^3)i}$ = 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 $_{(IA\text{-}ft^3)i}$:

$$\text{BMP-Volume}_{(\text{IA-ft}^3)i} = \text{BMP-Volume}_{\text{ft}^3} - \text{BMP-Volume}_{(\text{PA-ft}^3)i} \quad \textbf{(Equation 3-6b)}$$

To determine $\text{BMP-Volume}_{(\text{IA-ft}^3)i}$, 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 ($\text{BMP-Volume}_{\text{ft}^3}$). 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 $\text{BMP-Volume}_{\text{ft}^3}$ determined in step 2 into inches of runoff from the contributing impervious area ($\text{BMP Volume}_{(\text{IA-in})1}$) using equation 3-7a.

$\text{BMP-Volume}_{(\text{IA-in})1} = (\text{BMP-Volume}_{\text{ft}^3}/\text{IA (acre)}) \times (12 \text{ in/ft} / 43{,}560 \text{ ft}^2/\text{acre})$ **(Equation 3-7a)**;

For iterations 2 through n (2…n), convert the BMP Volume $_{(\text{IA-ft}^3)2\ldots n}$, determined in step 5a below, into inches of runoff from the contributing impervious area ($\text{BMP Volume}_{(\text{IA-in})2\ldots n}$) using equation 3-7b.

$\text{BMP-Volume}_{(\text{IA-in})2\ldots n} = (\text{BMP-Volume}_{(\text{IA-ft}^3)2\ldots n} / \text{IA (acre)}) \times (12 \text{ in/ft} / 43{,}560 \text{ ft}^2/\text{acre})$ **(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^3) from the contributing PA (BMP Volume $_{\text{PA-ft}^3}$) for a rainfall size equal to the sum of $\text{BMP-Volume}_{(\text{IA-in})1}$, determined in step 3. The runoff volume for each distinct pervious area must be determined.

$\text{BMP Volume}_{(\text{PA-ft}^3)1\ldots n} = \sum ((\text{PA} \times (\text{runoff depth})_{(\text{PA1, PA2..PAn})} \times (3{,}630 \text{ ft}^3/\text{acre-in})$ **(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 $\text{BMP-Volume}_{\text{PA-ft}^3}$, determined in step 4, from $\text{BMP-Volume}_{\text{ft}^3}$, determined in step 2, and convert to inches of runoff from IA (see equations 3-9a and 3-9b):

$\text{BMP-Volume}_{(\text{IA-ft}^3)2} = ((\text{BMP-Volume}_{\text{ft}^3} - \text{BMP Volume}_{(\text{PA-ft}^3)1})$ **(Equation 3-9a)**

$\text{BMP-Volume}_{(\text{IA-in})2} = (\text{BMP-Volume}_{(\text{IA-ft}^3)2}/\text{IA (acre)}) \times (12 \text{ in/ft} \times 1 \text{ acre}/43{,}560 \text{ ft}^2)$ **(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 ($\text{BMP-Volume}_{(\text{IA-in})3..n+1}$) by subtracting $\text{BMP Volume}_{(\text{PA-ft}^3)2..n}$, determined in step 4, from $\text{BMP Volume}_{(\text{IA-ft}^3)3..n+1}$, determined in step 5, and by converting to inches of runoff from IA using equation 3-9b):

6) For iteration a (an iteration between 1 and n+1), compare BMP Volume $_{(IA\text{-}in)a}$ to BMP Volume $_{(IA\text{-}in)a\text{-}1}$ determined from the previous iteration (a-1). If the difference in these values is greater than 5% of BMP Volume $_{(IA\text{-}in)a}$ then repeat steps 4 and 5, using BMP Volume $_{(IA\text{-}in)a}$ as the new starting value for the next iteration (a+1). If the difference is less than or equal to 5 % of BMP Volume $_{(IA\text{-}in)a}$ then the permittee may proceed to step 7;

7) Determine the % phosphorus load reduction for the structural BMP (BMP Reduction $_{\%\text{-}P}$) using the appropriate BMP performance curve and the BMP-Volume $_{(IA\text{-}in)n}$ 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 $_{lbs\text{-}P}$) using the BMP Load as calculated from the procedure in Attachment 1 to Appendix F and the percent phosphorus load reduction (BMP Reduction $_{\%\text{-}P}$) determined in step 7 by using equation 3-4:

BMP Reduction $_{lbs\text{-}P}$ = BMP Load x (BMP Reduction $_{\%\text{-}P}$/100) **(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^3)	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 $_{\%\text{-}P}$) 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 $_{lbs\text{-}P}$)

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 (ft^3) of the infiltration basin (BMP-Volume $_{ft^3}$) is determined from the design details and basin dimensions; BMP-Volume $_{ft^3} = 48{,}155\ ft^3$.

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$_{ft^3}$ is converted into inches of runoff from the contributing impervious area (BMP Volume $_{(IA\text{-}in)1}$) using equation 3-5a.

BMP Volume $_{(IA\text{-}in)1}$ = (48,155 ft^2/ 11.75 acre) x (12 in/ft /43,560 ft^2/acre)
= 1.13 in

4-1) The total volume of runoff (ft^3) from the contributing PA (BMP Volume $_{PA\text{-}ft^3}$) for a rainfall size equal to the sum of BMP Volume $_{(IA\text{-}in)1}$ 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.

BMP Volume $_{(PA\text{-}ft^3)1}$ = ((3.84 acre x (0.33 in) + (0.96 acre x (0.13 in)) x 3,630 ft^3/acre-in
= 5052 ft^3

5-1) For iteration 1, the portion of BMP Volume that is available to treat runoff from only the IA is estimated by subtracting the BMP Volume $_{(PA\text{-}ft^3)1}$, determined in step 4-1, from BMP Volume$_{ft^3}$, determined in step 2, and converted to inches of runoff from IA:

BMP Volume $_{(IA\text{-}ft^3)2}$ = 48,155 ft^3 – 5052 ft^3
= 43,103 ft^3
BMP Volume $_{(IA\text{-}in)2}$ = (43,103 ft^3/11.75 acre) x (12 in/ft x 1 acre/43,560 ft^2)
= 1.01 in

Solution continued:

6-1) The % difference between BMP Volume $_{(IA\text{-}in)\,2}$, 1.01 in, and BMP Volume $_{(IA\text{-}in)1}$, 1.13 in is determined and found to be significantly greater than 5%:

% Difference = ((1.13 in – 1.01 in)/1.01 in) x 100
= 12%

Therefore, steps 4 through 6 are repeated starting with BMP Volume $_{(IA\text{-}in)\,2}$ = 1.01 in.

Solution Iteration 2

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

5-2) BMP-Volume $_{(IA\text{-}ft^3)\,3}$ = 48,155 ft^3 – 3,358 ft^3
= 44,797 ft^3
BMP-Volume $_{(IA\text{-}in)\,3}$ = (44,797 ft^3/11.75 acre) x (12 in/ft x 1 acre/43,560 ft^2)
= 1.05 in

6-2) % Difference = ((1.05 in – 1.01 in)/1.05 in) x 100
= 4%

The difference of 4% is acceptable.

7) The % phosphorus load reduction for the infiltration basin (BMP Reduction $_{\%\text{-}P}$) is determined by using the infiltration basin performance curve for an infiltration rate of 0.27 in/hr and the treatment volume (BMP-Volume $_{Net\ IA\text{-}in}$ = 1.05 in) calculated in step 5-2 and is **BMP Reduction $_{\%\text{-}P}$ = 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 $_{\%\text{-}P}$ = 93% for IR = 0.27 in/hr and BMP Reduction $_{\%\text{-}P}$ = 95% for IR = 0.52 in/hr).

8) The cumulative phosphorus load reduction in pounds of phosphorus (BMP-Reduction $_{lbs\text{-}P}$) for the proposed infiltration basin is calculated by using equation 3-2 with the BMP Load and the P $_{target}$ of 93%.
BMP-Reduction $_{lbs\text{-}P}$ = BMP Load x (P $_{target}$ /100) **(Equation 3-2)**

Using Table 3-1, the BMP load is calculated:
BMP Load = (IA x impervious cover phosphorus export loading rate for industrial)
+ (PA $_{HSG\,D}$ x pervious cover phosphorus export loading rate for HSG D)
+ (PA $_{HSG\,C}$ x pervious cover phosphorus export loading rate for HSG C)

Solution continued:

= (11.75 acre x 1.96 lbs/acre/yr) + (3.84 acre x 0.37 lbs/acre/yr)
+ (0.96 acre x 0.21 lbs/acre/yr)
= 24.65 lbs/yr

BMP-Reduction $_{lbs-P}$ = 24.22 lbs/yr x 93/100 = **22.93 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^3) 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 $_{\%-P}$) 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 $_{lbs-P}$) 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:
   Storage Volume $_{IA-in}$ = (668.4 ft^3/(0.75 acre x 43.560 ft^2/acre)) x 12 inch/ft
   = 0.25 inches

2. Determine the ratio of the contributing impervious area to the receiving pervious area:
   IA:PA = 0.75 acres/0.09 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 $_{IA-in}$	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 $_{lbs-P}$) is calculated using Equation 3-2. The BMP Load is first determined using the method described above.

Solution continued:

BMP Load = IA x phosphorus export loading rate for commercial IA (see Table 3-1)
= 0.75 acres x 1.78 lbs/acre/yr
= 1.34 lbs/yr

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

BMP Reduction $_{lbs-P}$ = 1.34 lbs/yr x (39/100)
= **0.53 lbs/yr**

Table Example 3-5-B presents the BMP Reduction $_{lbs-P}$ 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 $_{IA-in}$	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 $_{\%-P}$) 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 $_{lbs-P}$).

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:

2. 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%

3. The cumulative phosphorus load reduction in pounds of phosphorus for the IA disconnection with storage (BMP-Reduction $_{lbs-P}$) is calculated using Equation 3-2. The BMP Load was calculated in example 3-5 and is 1.34 lbs/yr.

BMP Reduction $_{lbs-P}$ = BMP Load x (BMP Reduction $_{\%-P}$/100)
For PA of 0.09 acres HSG C the BMP Reduction $_{lbs-P}$ is calculated as follows:
BMP Reduction $_{lbs-P(0.09ac- HSG C)}$ = 1.34 lbs/yr x (7/100)
= **0.09 lbs/yr**
Table Example 3-6-B presents the BMP Reduction $_{lbs-P}$ 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 $_{\%\text{-P}}$) 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 $_{\text{lbs-P}}$).

Solution:

1. Determine the area of IA to be converted to PA:
   New PA = (((3.7 mi x 4 ft) + (3.2 mi x 4 ft)) x 5280 ft/mi)/43,560 ft^2/acre
   = 3.35 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.
   BMP Load = IA x phosphorus export loading rate for MDR IA (see Table 3-1)
   = 3.35 acres x 1.96 lbs/acre/yr
   = 6.57 lbs/yr
4. The cumulative phosphorus load reduction in pounds of phosphorus for the IA conversion (BMP-Reduction $_{\text{lbs-P}}$) is calculated using Equation 3-2.
   BMP Reduction $_{\text{lbs-P}}$ = BMP Load x (BMP Reduction $_{\%\text{-P}}$/100)
   BMP Reduction $_{\text{lbs-P}}$ = 6.57 lbs/yr x (94.1/100)
   = 6.18 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)

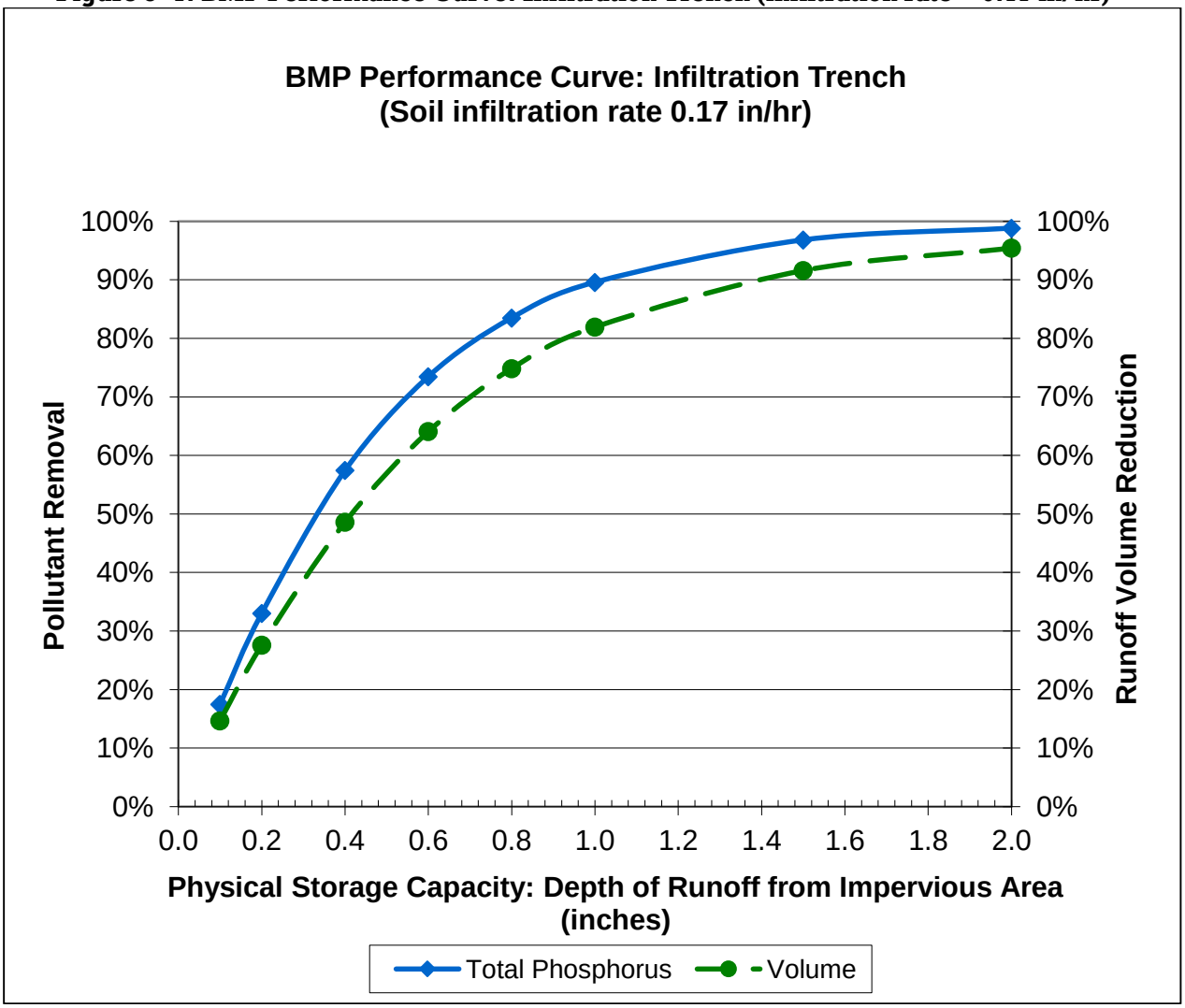


Table 3- 5: Infiltration Trench (IR = 0.27 in/hr) BMP Performance Table

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)

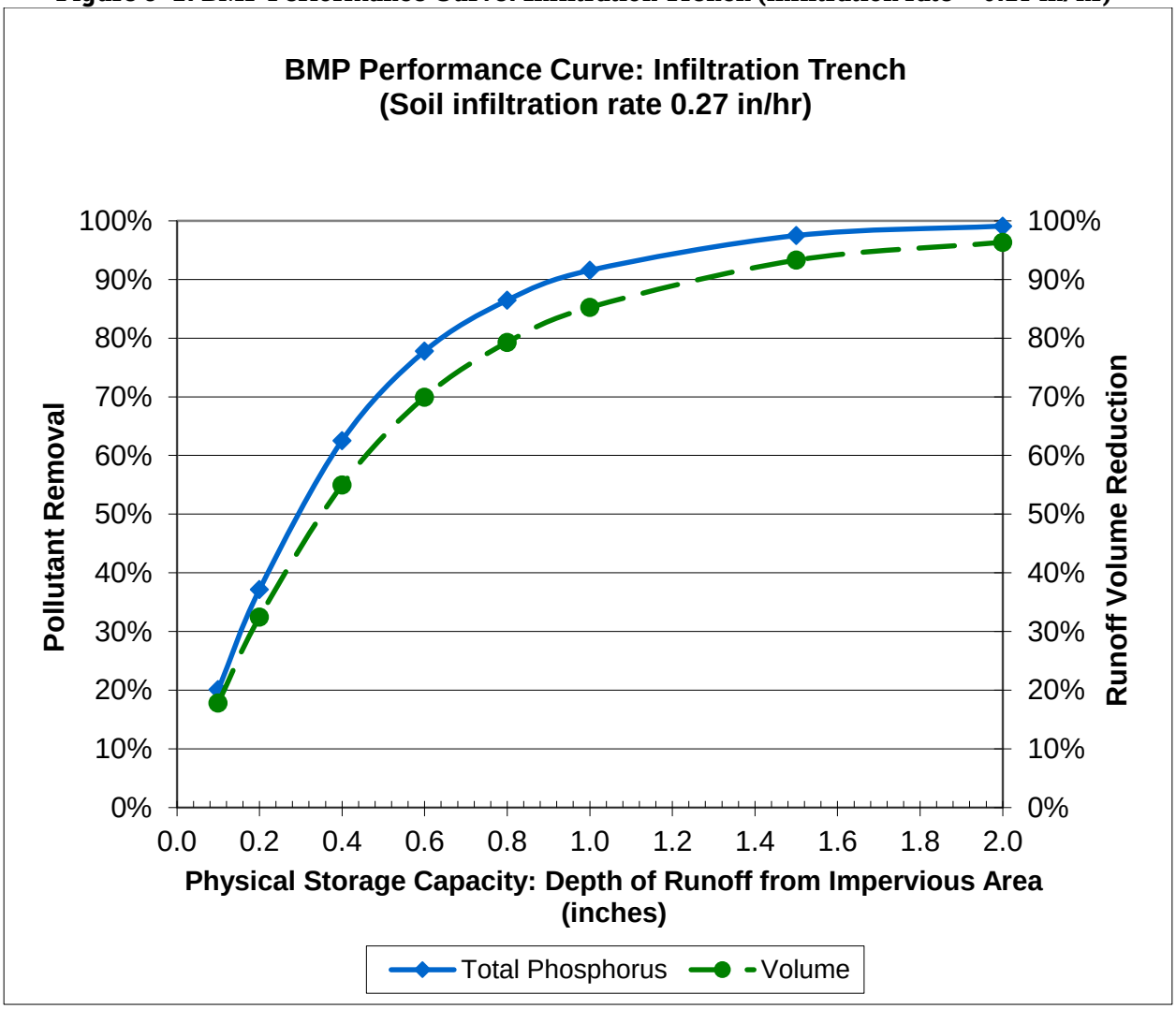


Table 3- 6: Infiltration Trench (IR = 0.52 in/hr) BMP Performance Table

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)

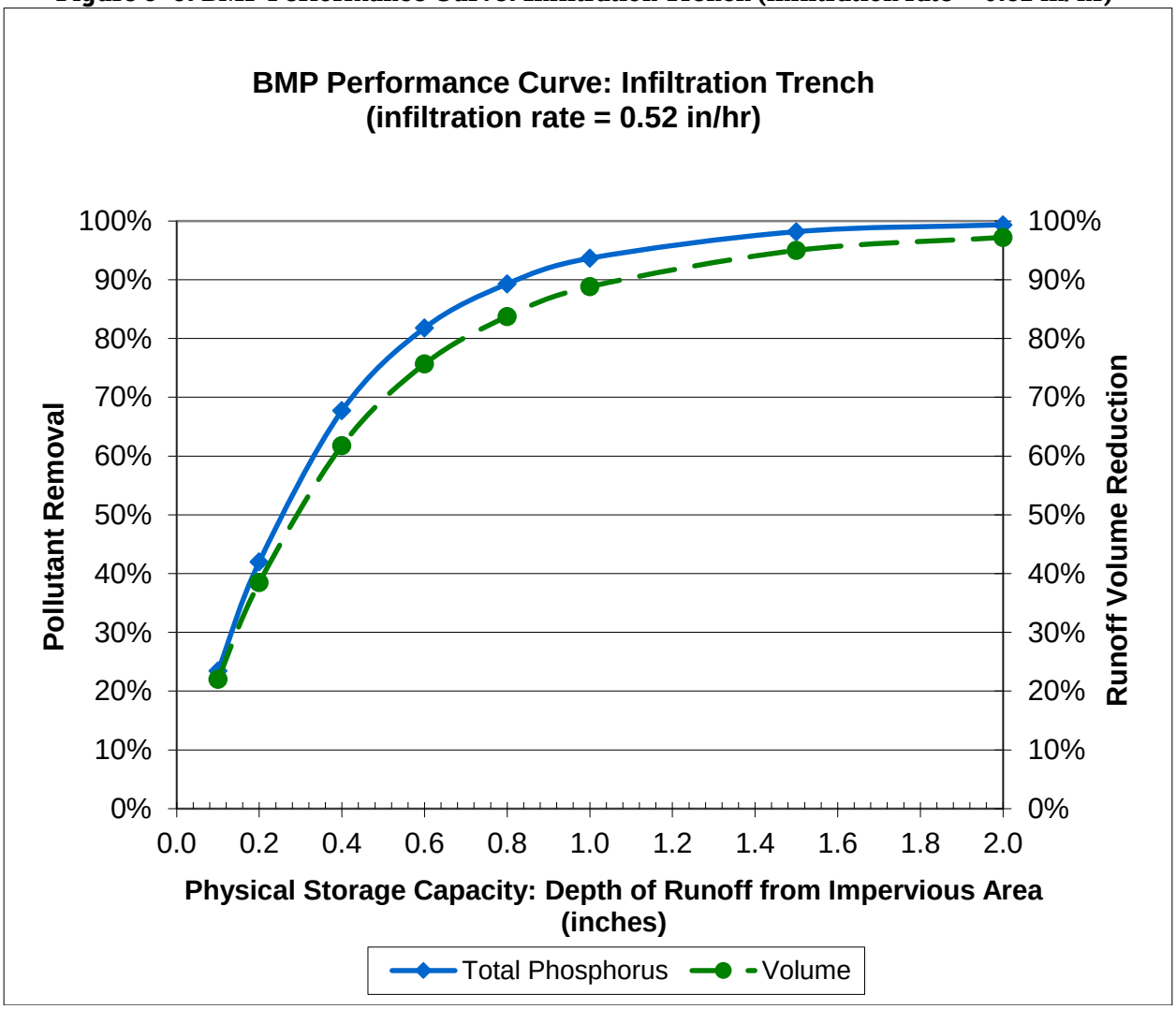


Table 3- 7: Infiltration Trench (IR = 1.02 in/hr) BMP Performance Table

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)

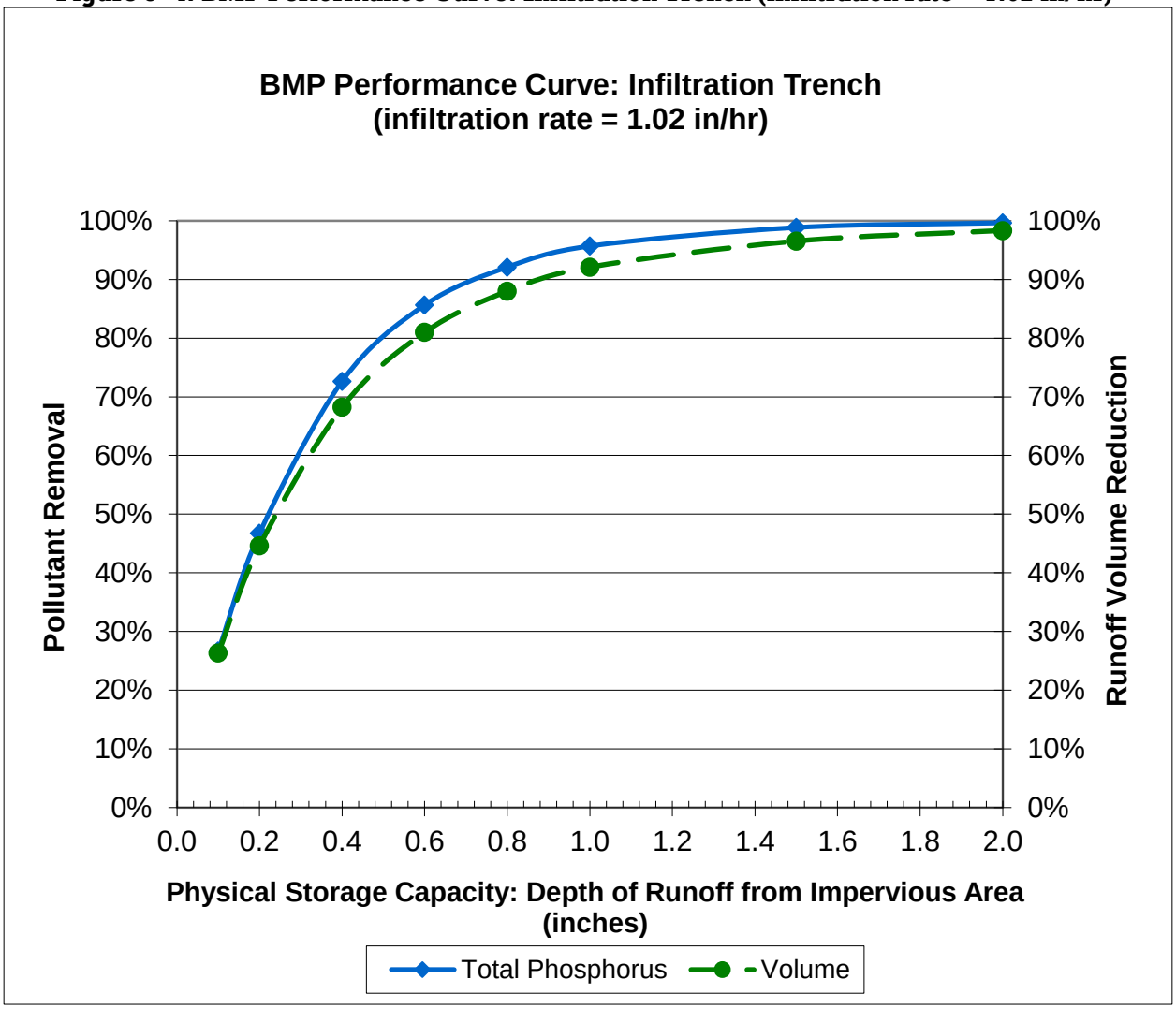


Table 3- 8: Infiltration Trench (IR = 2.41 in/hr) BMP Performance Table

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)

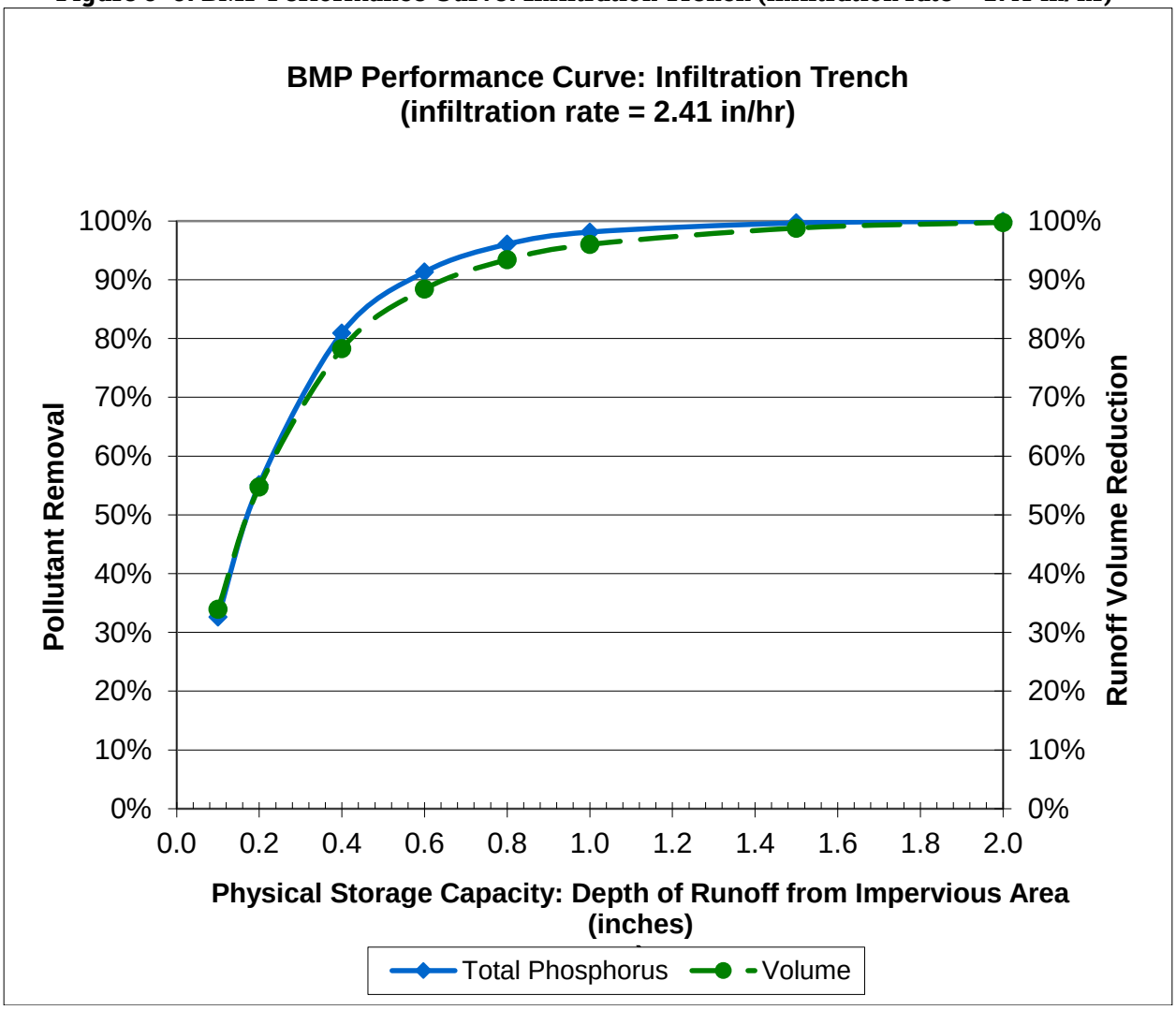


Table 3- 9: Infiltration Trench (8.27 in/hr) BMP Performance Table

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)

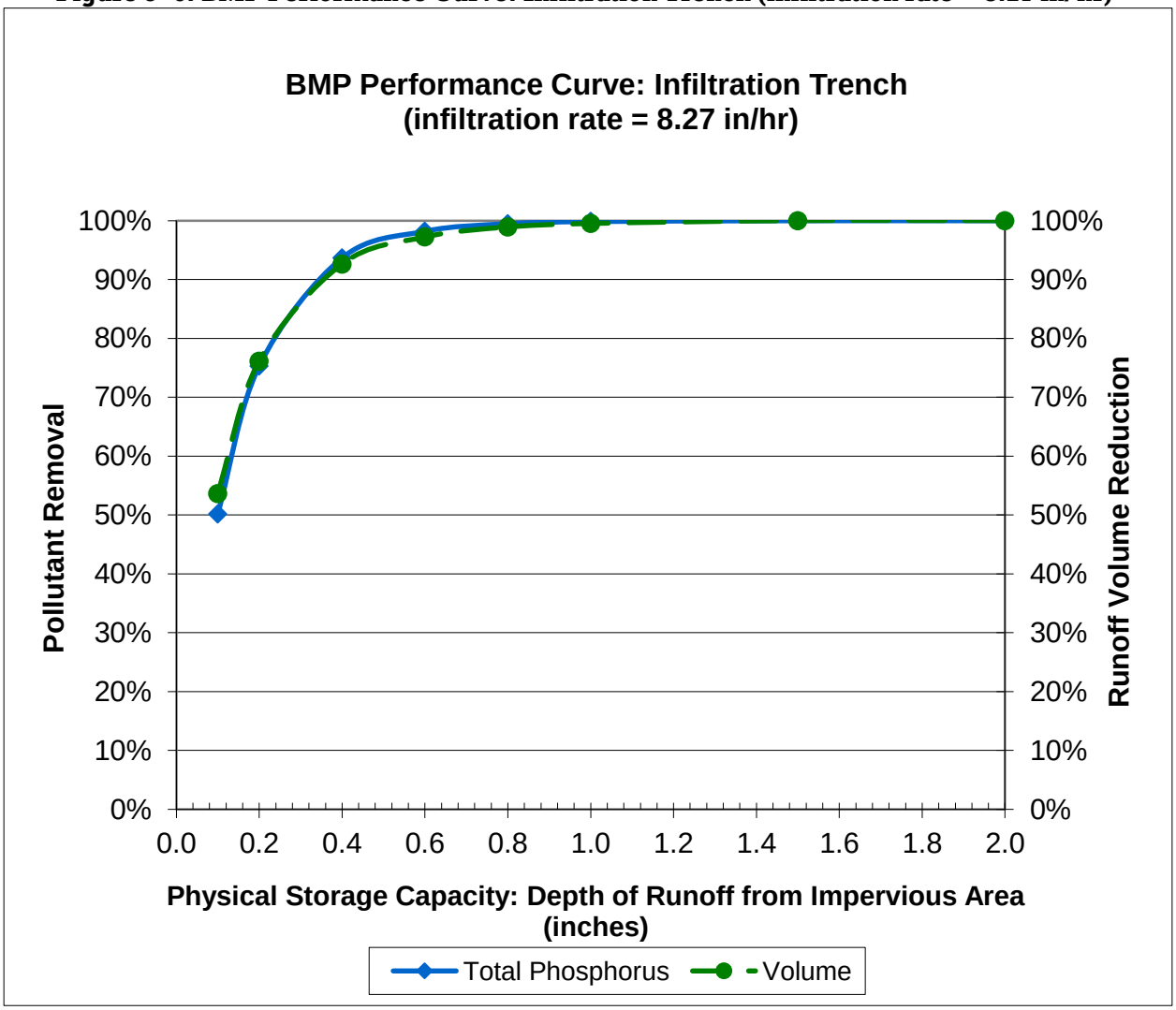


Table 3- 10: Infiltration Basin (0.17 in/hr) BMP Performance Table

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)

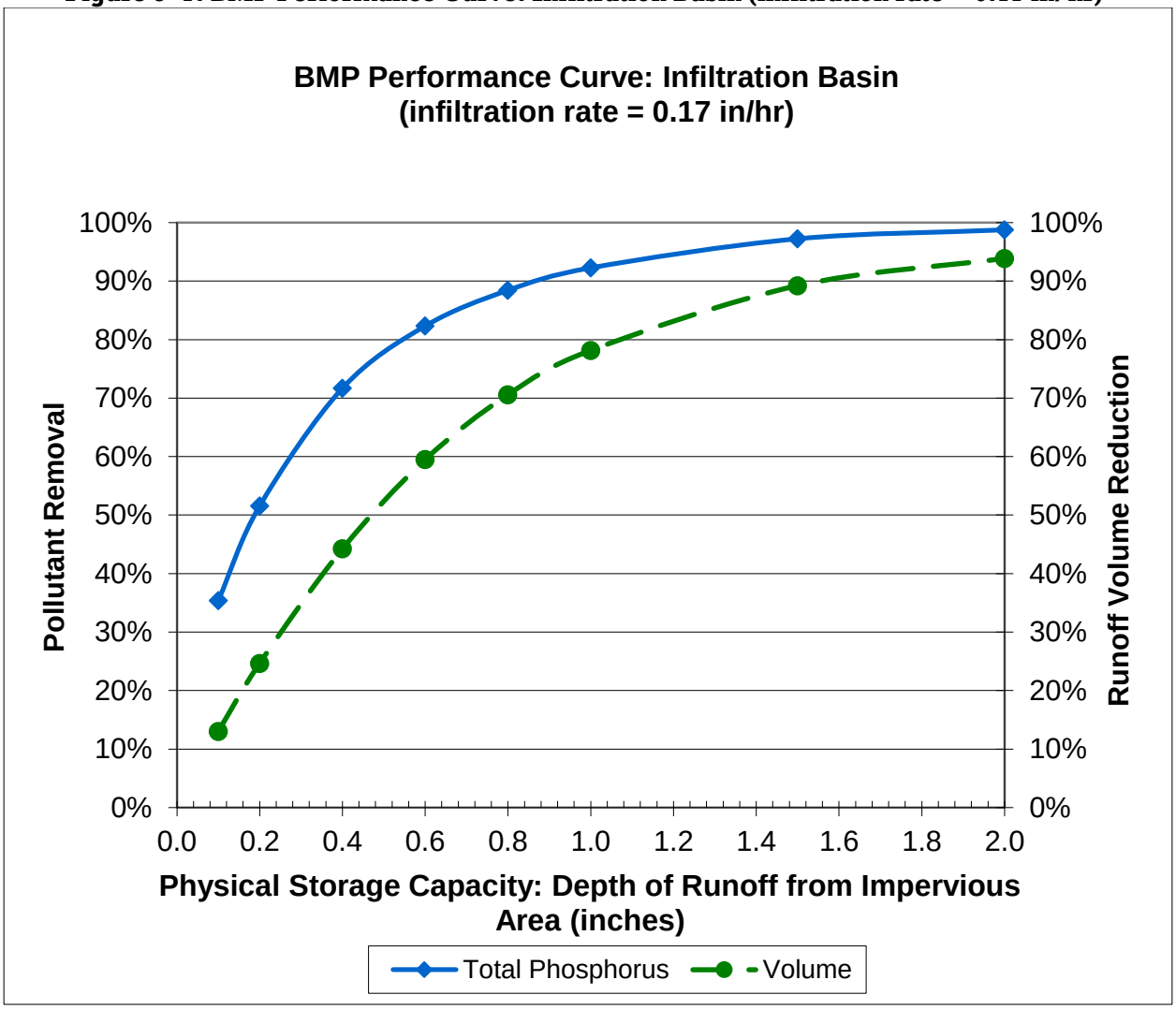


Table 3- 11: Infiltration Basin (0.27 in/hr) BMP Performance Table

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)

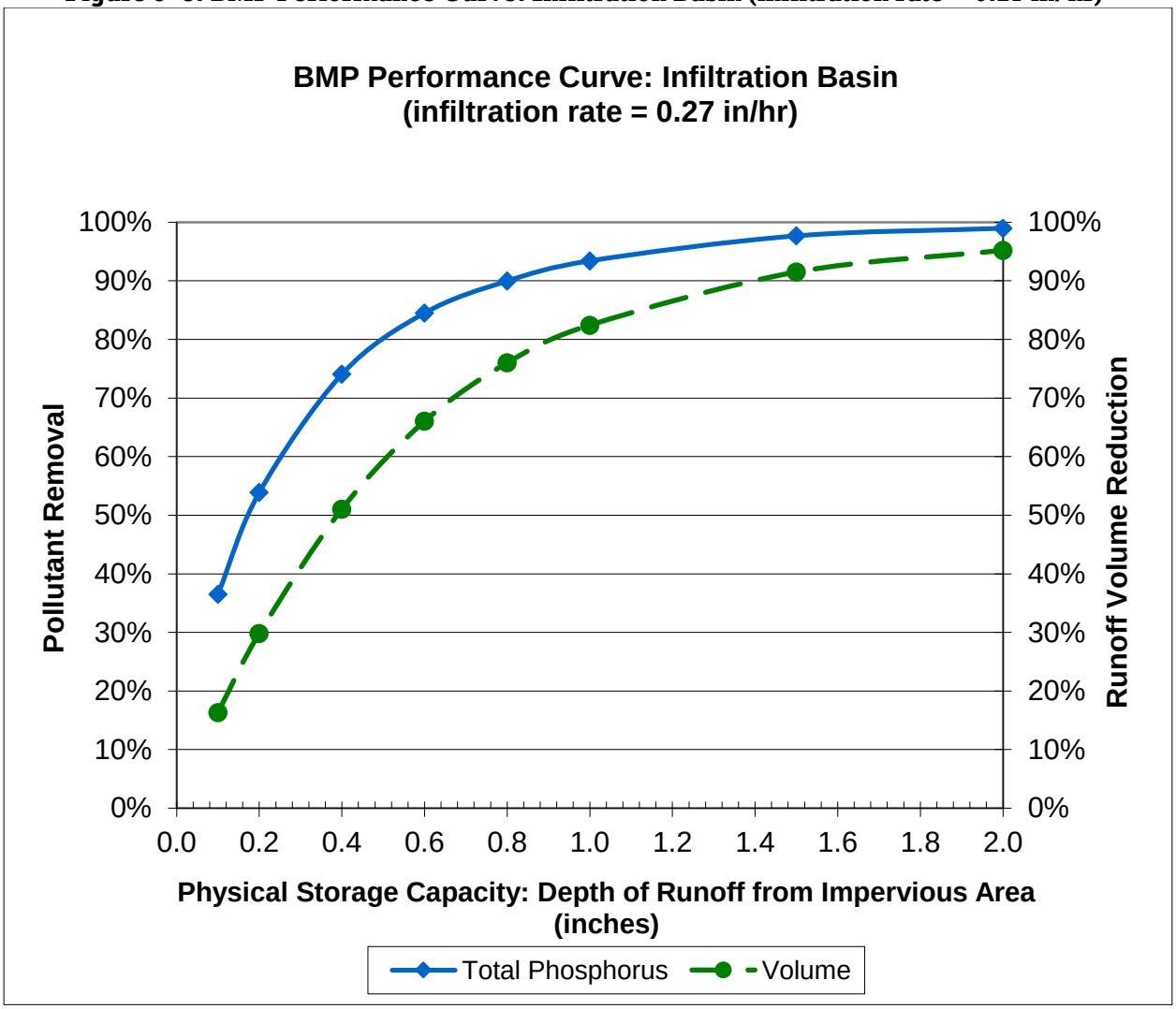


Table 3- 12: Infiltration Basin (0.52 in/hr) BMP Performance Table

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)

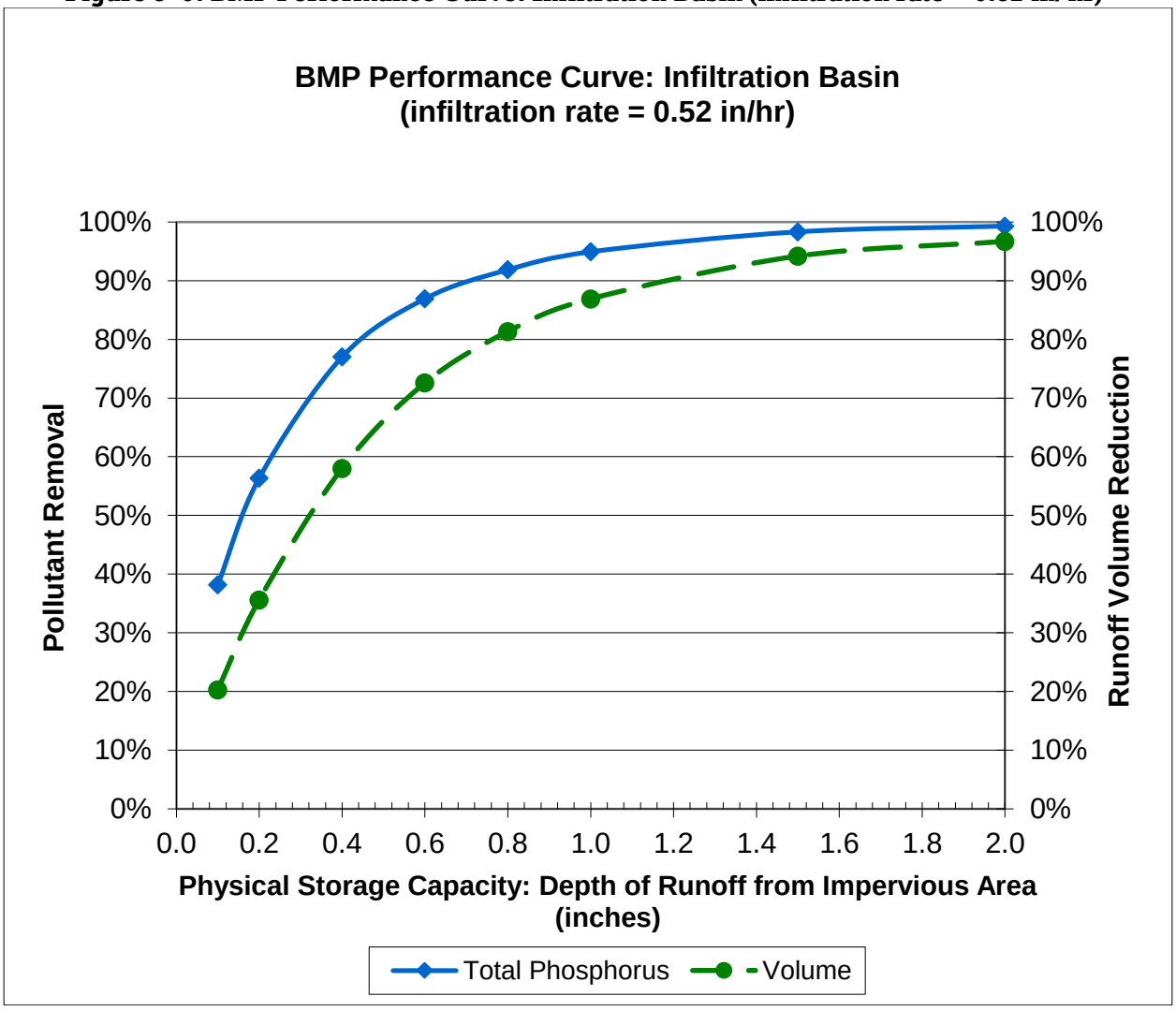


Table 3- 13: Infiltration Basin (1.02 in/hr) BMP Performance Table

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)

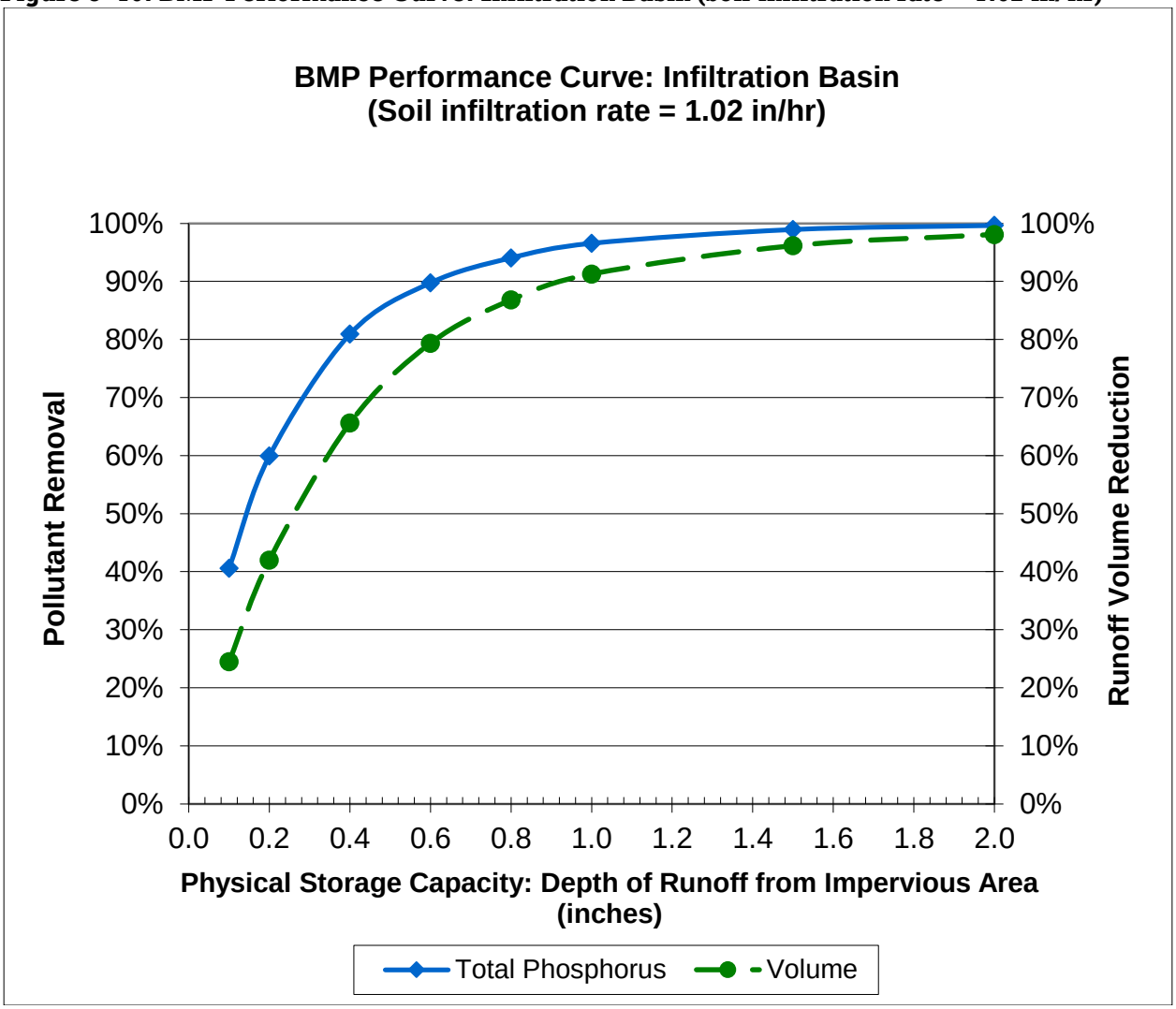


Table 3- 14: Infiltration Basin (2.41 in/hr) BMP Performance Table

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)

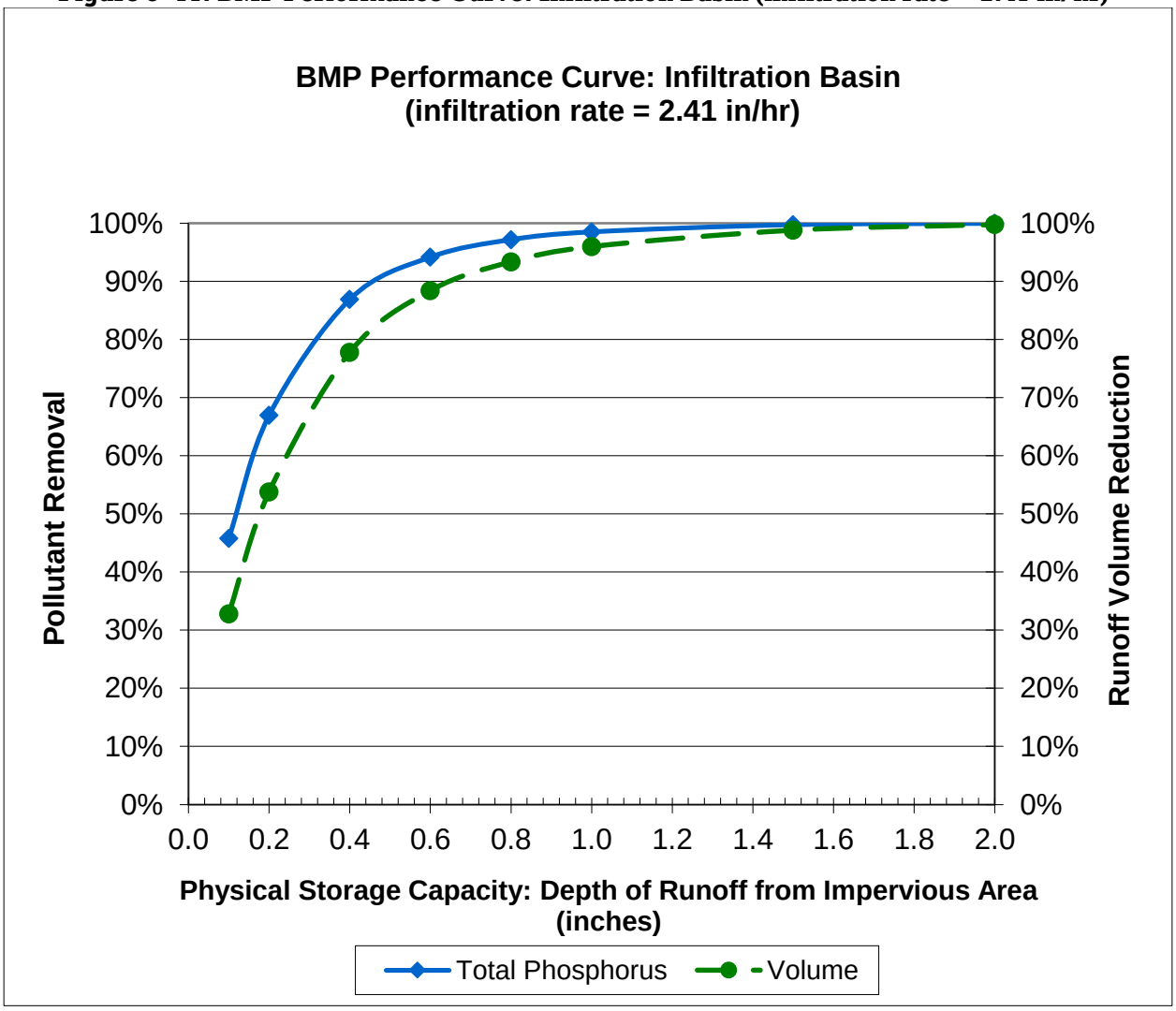


Table 3- 15: Infiltration Basin (8.27 in/hr) BMP Performance Table

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)

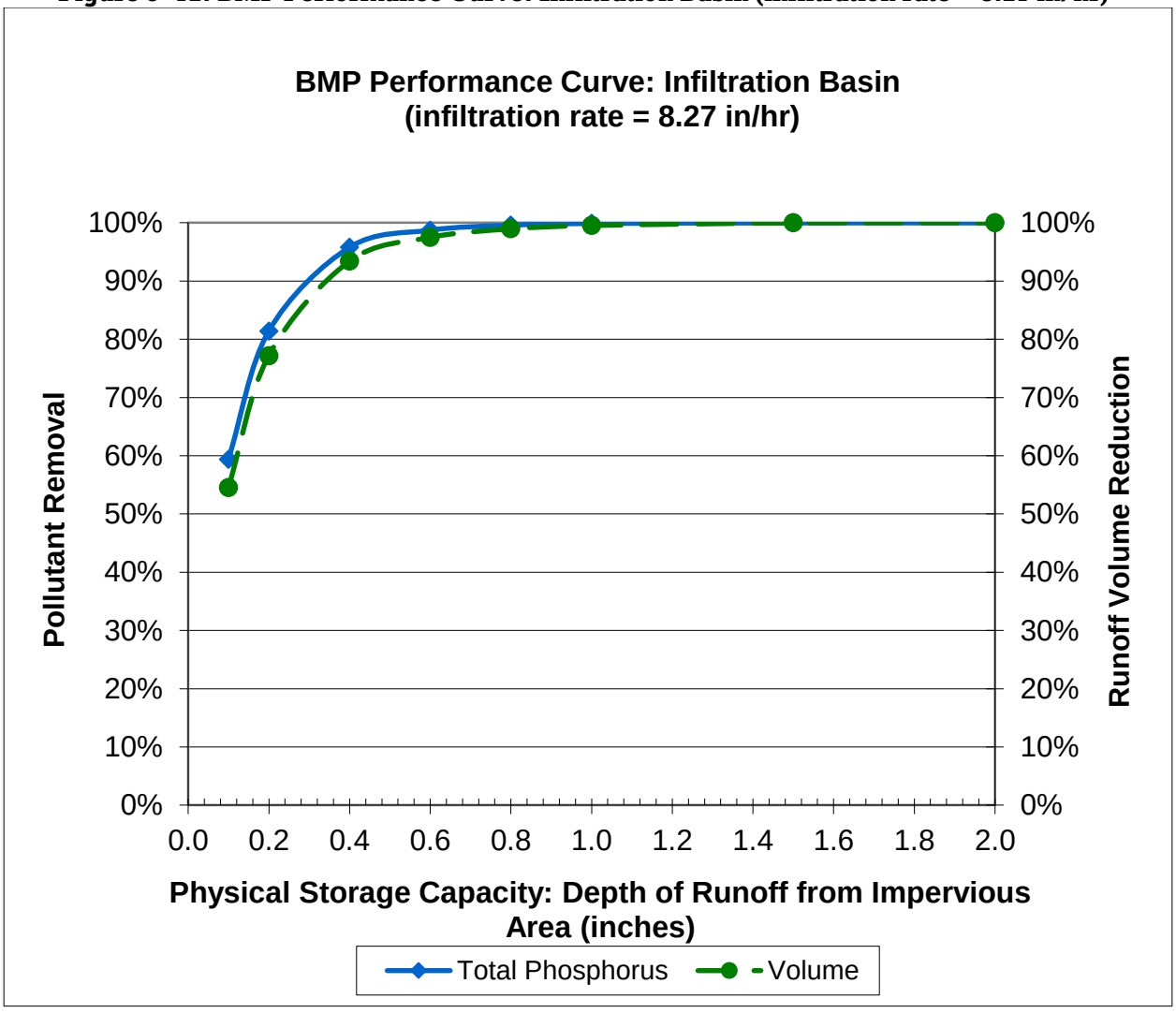


Table 3- 16: Biofiltration BMP Performance Table

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

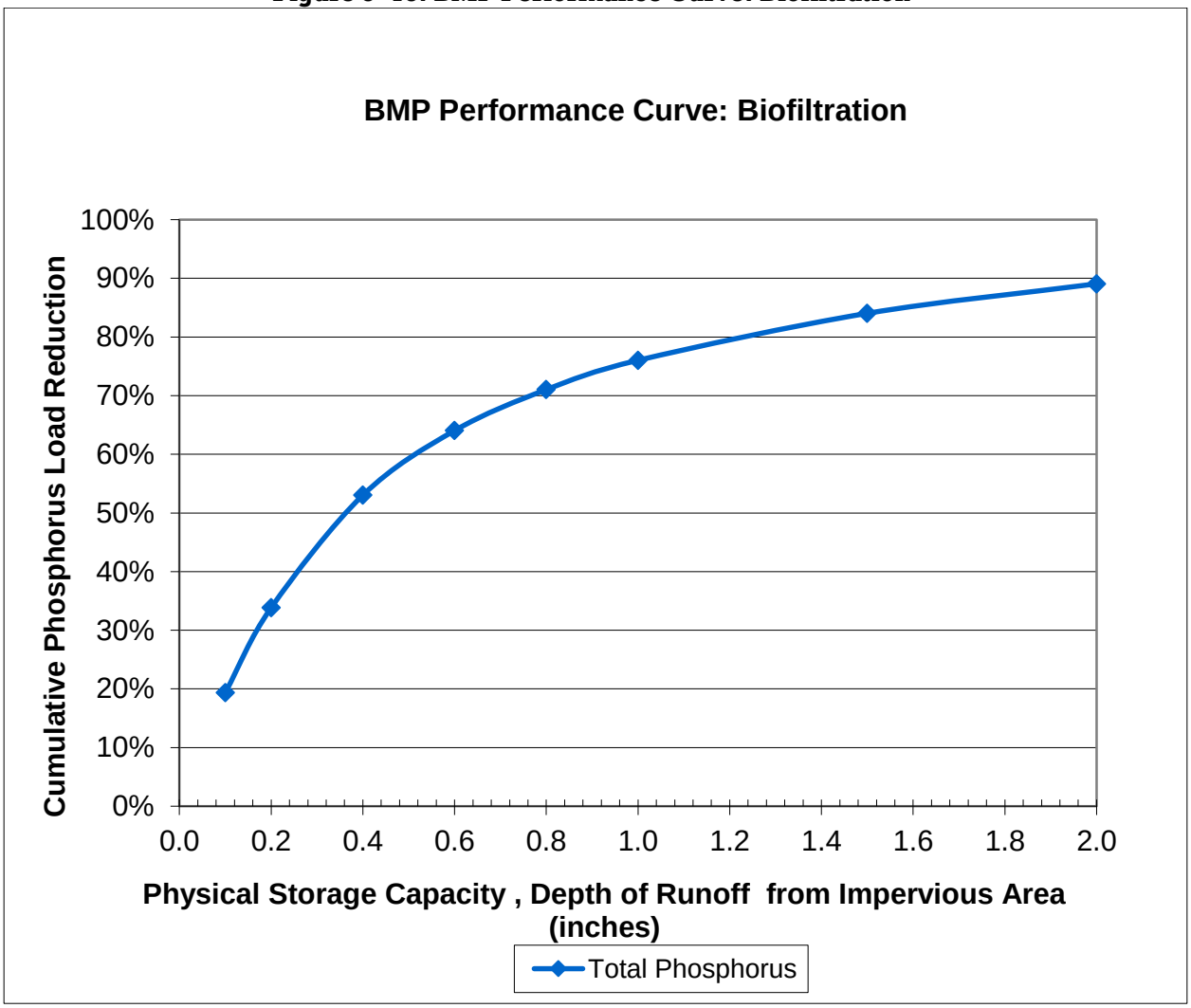


Table 3- 17: Gravel Wetland BMP Performance Table

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

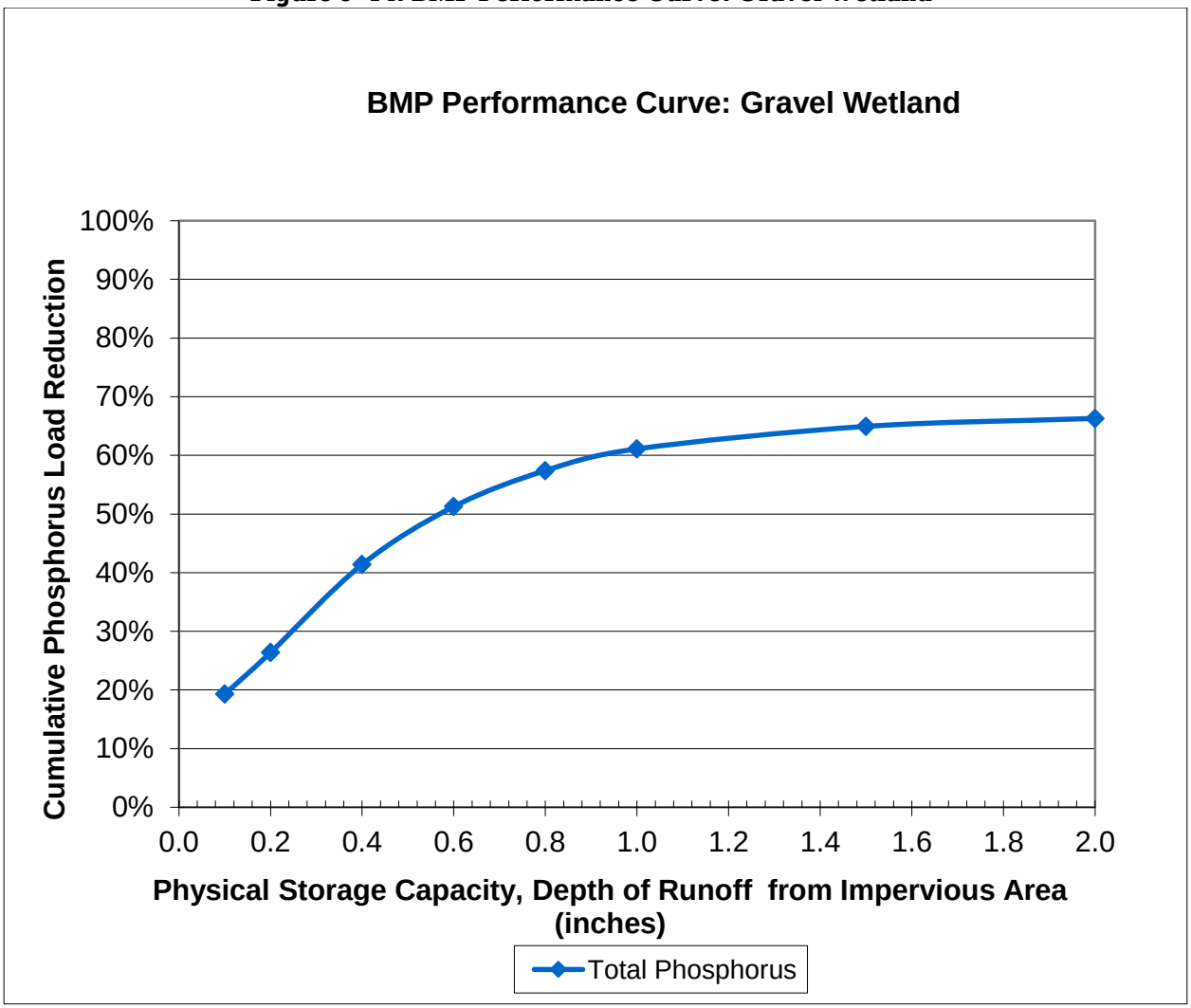


Table 3- 18: Porous Pavement BMP Performance Table

Porous Pavement BMP Performance Table: Long-Term Phosphorus Load Reduction				
BMP Capacity: Depth of Filter Course Area (inches)	12.0	18.0	24.0	32.0
Cumulative Phosphorus Load Reduction	62%	70%	75%	78%

Figure 3- 15: BMP Performance Curve: Porous Pavement

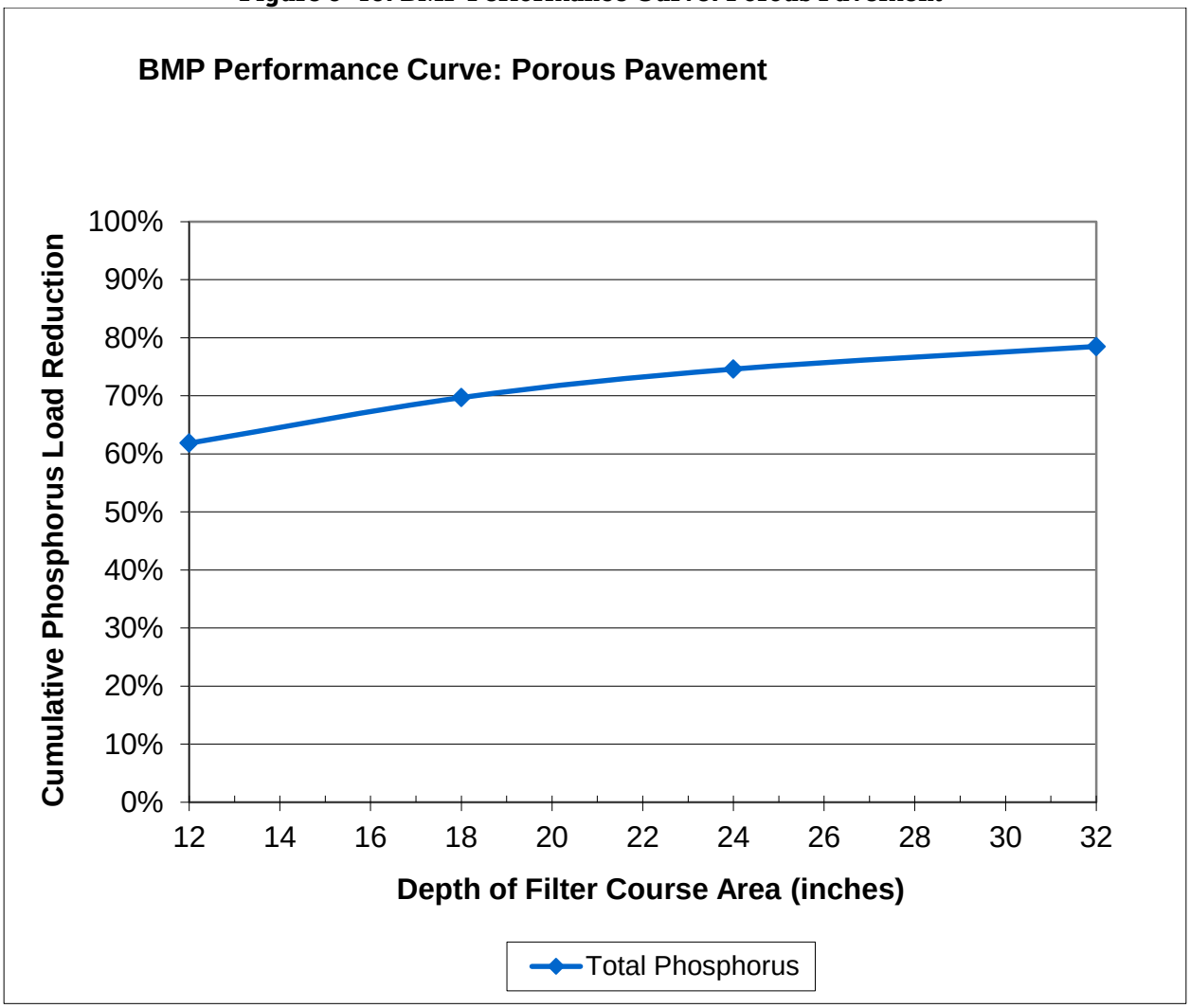


Table 3- 19: Wet Pond BMP Performance Table

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

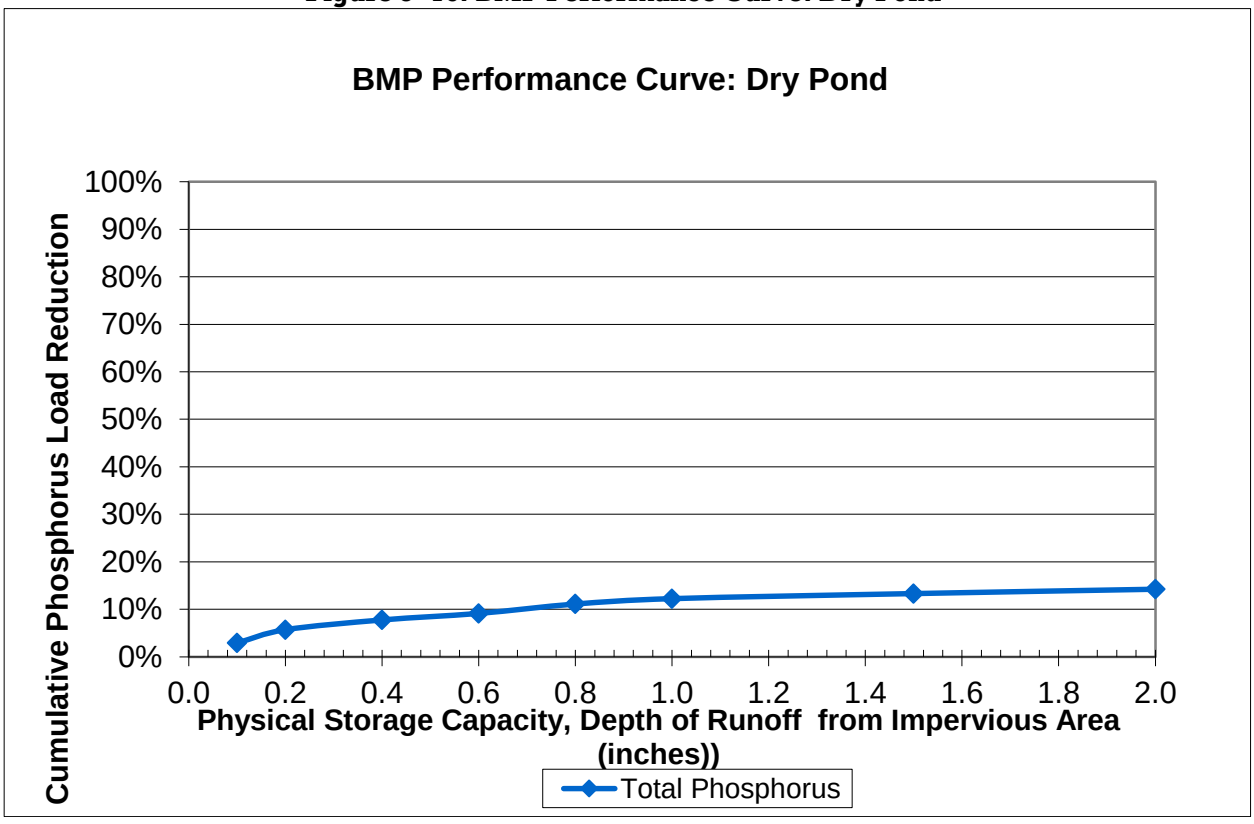


Table 3- 21: Grass Swale BMP Performance Table

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

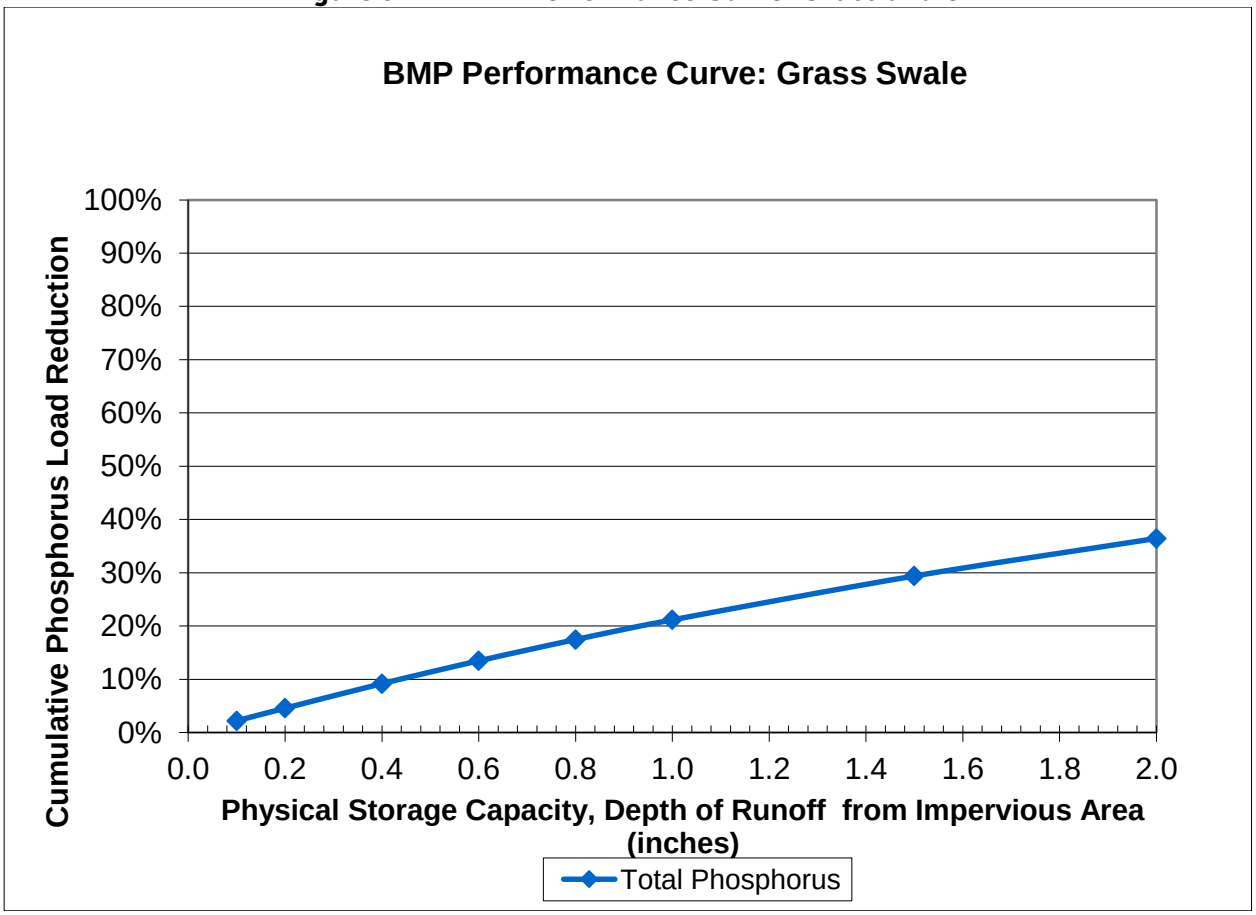


Table 3- 22: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1

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

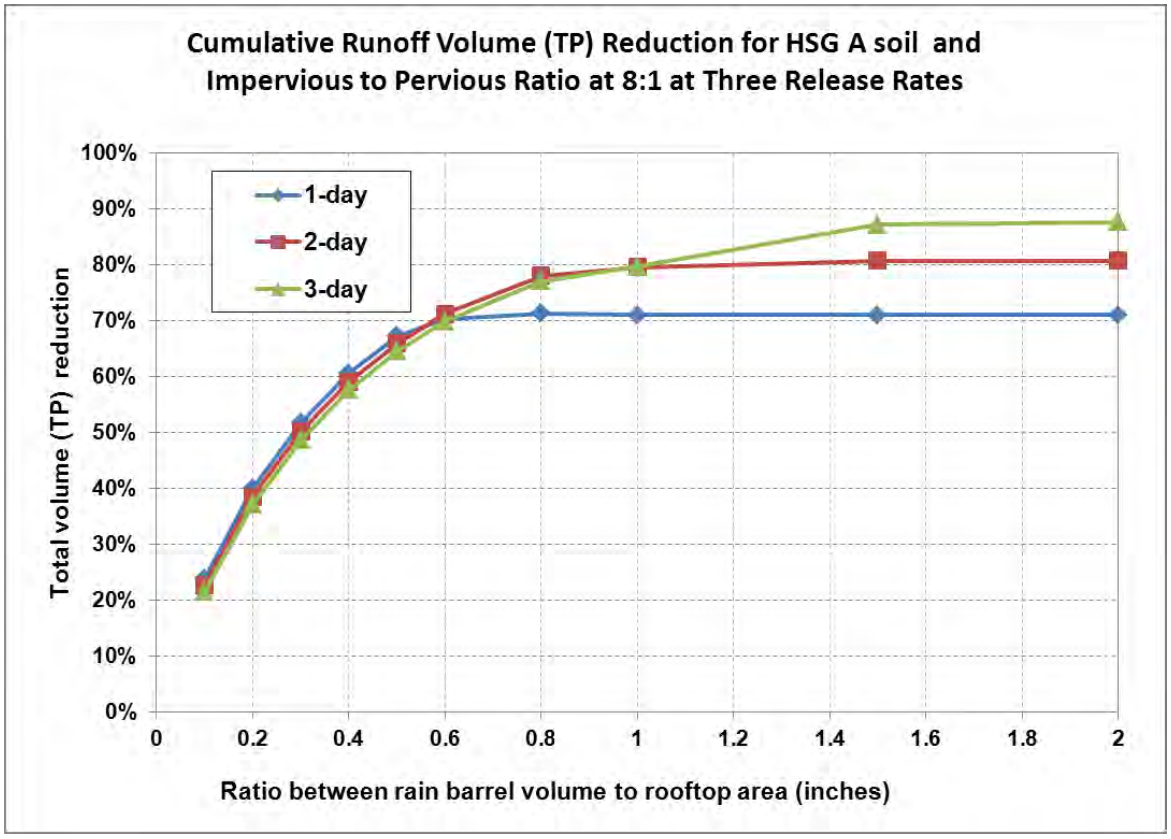


Figure 3- 19: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1 for HSG B Soils

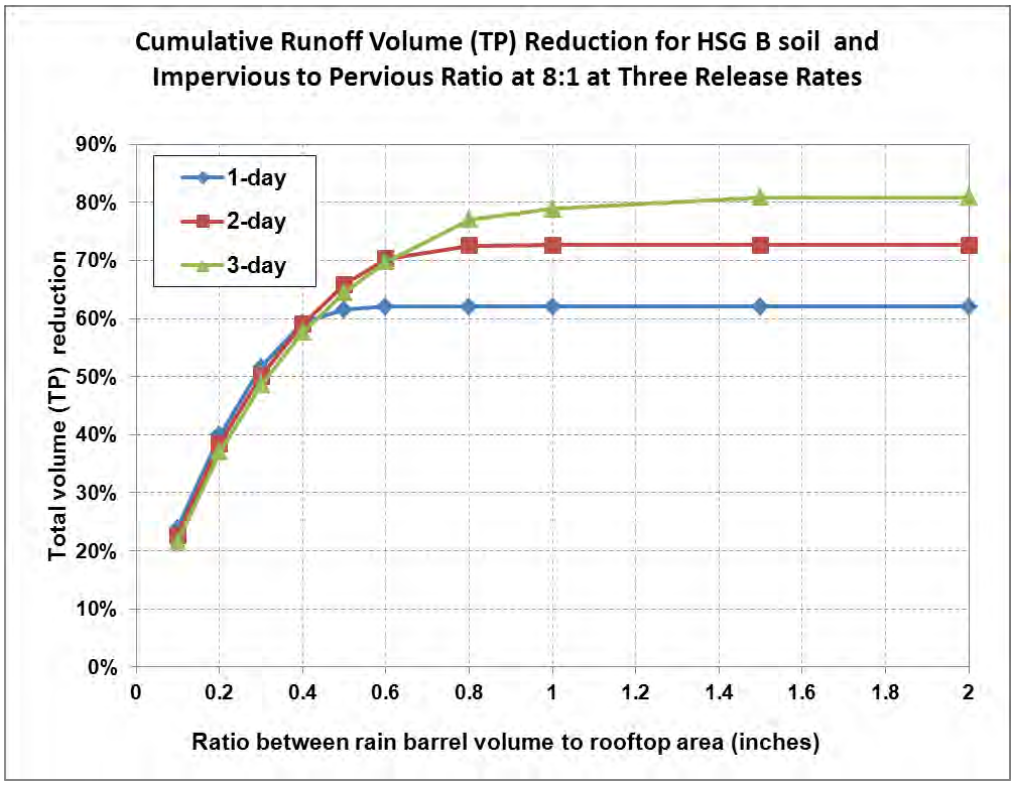


Figure 3- 20: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1 for HSG C Soils

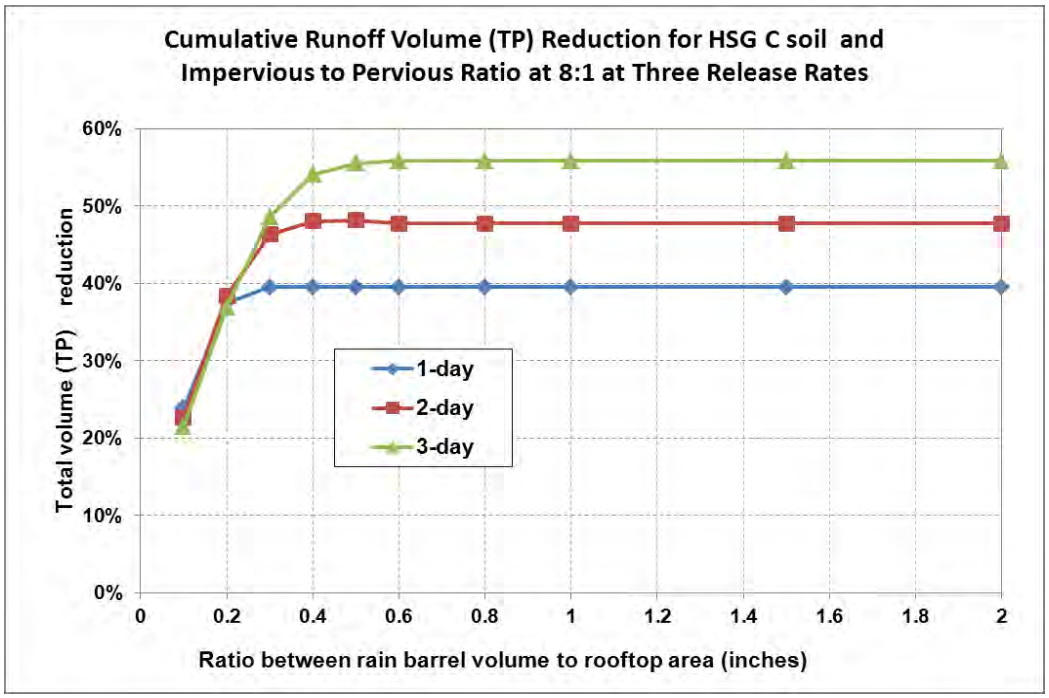


Figure 3- 21: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 8:1 for HSG D Soils

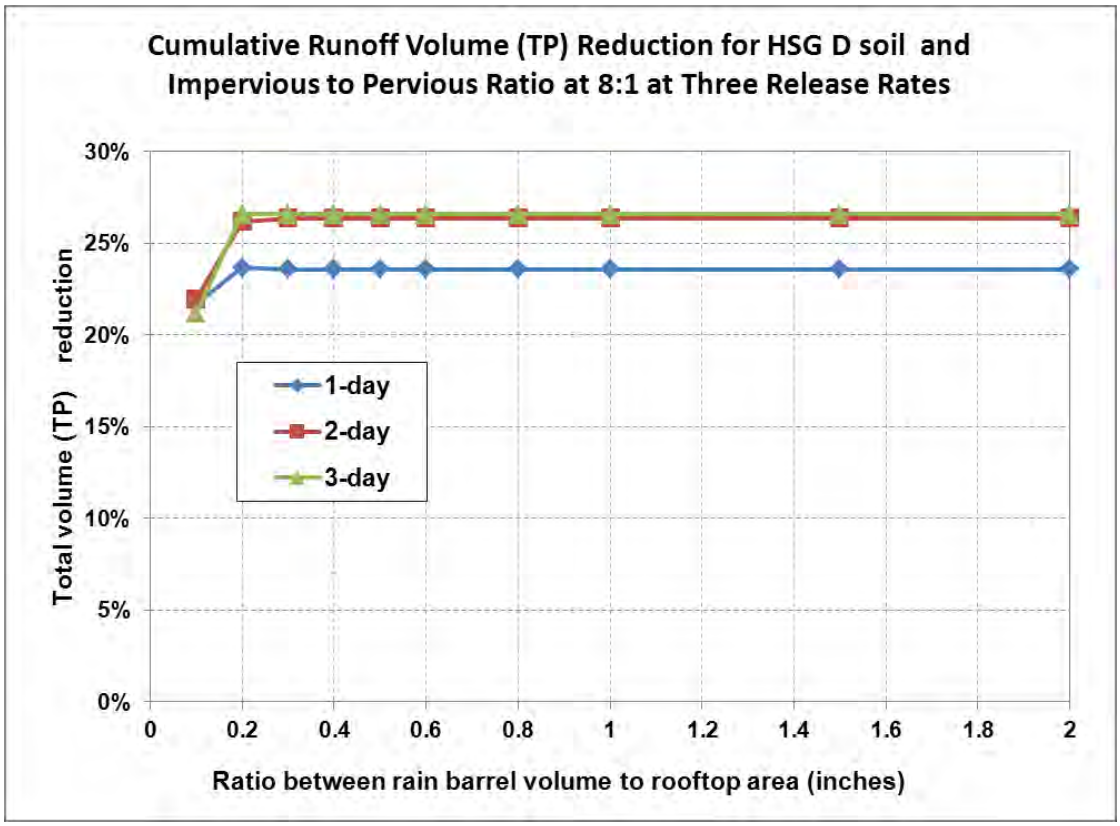


Table 3- 23: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1

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

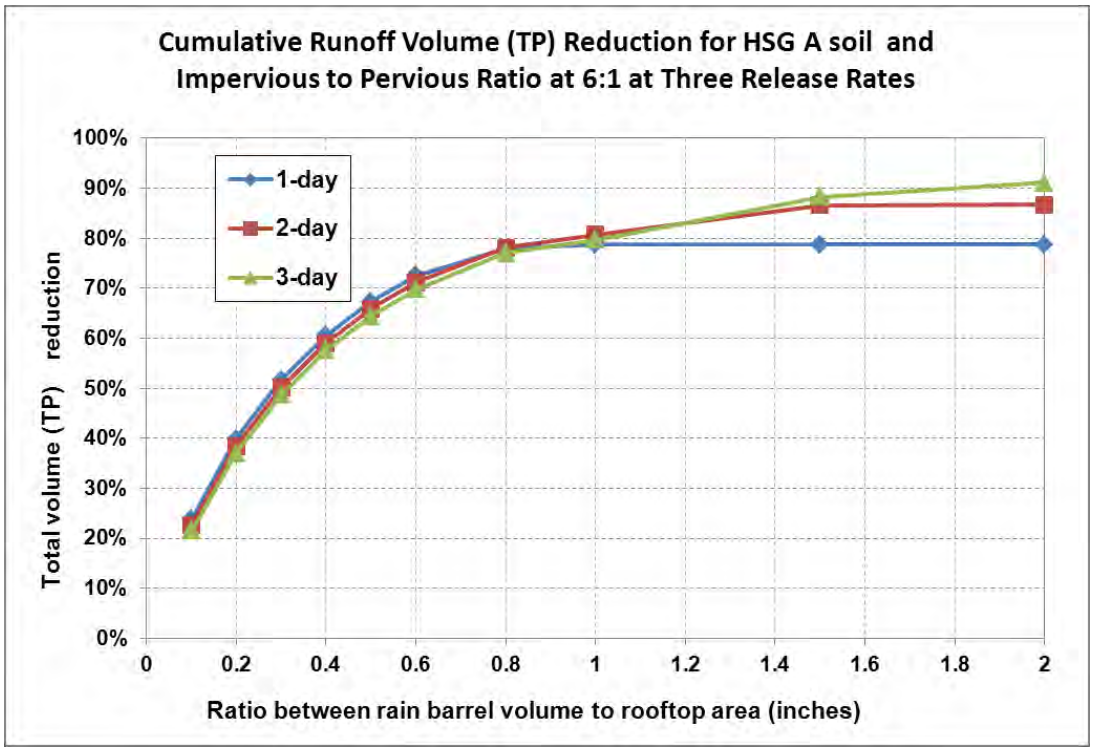


Figure 3- 23: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1 for HSG B Soils

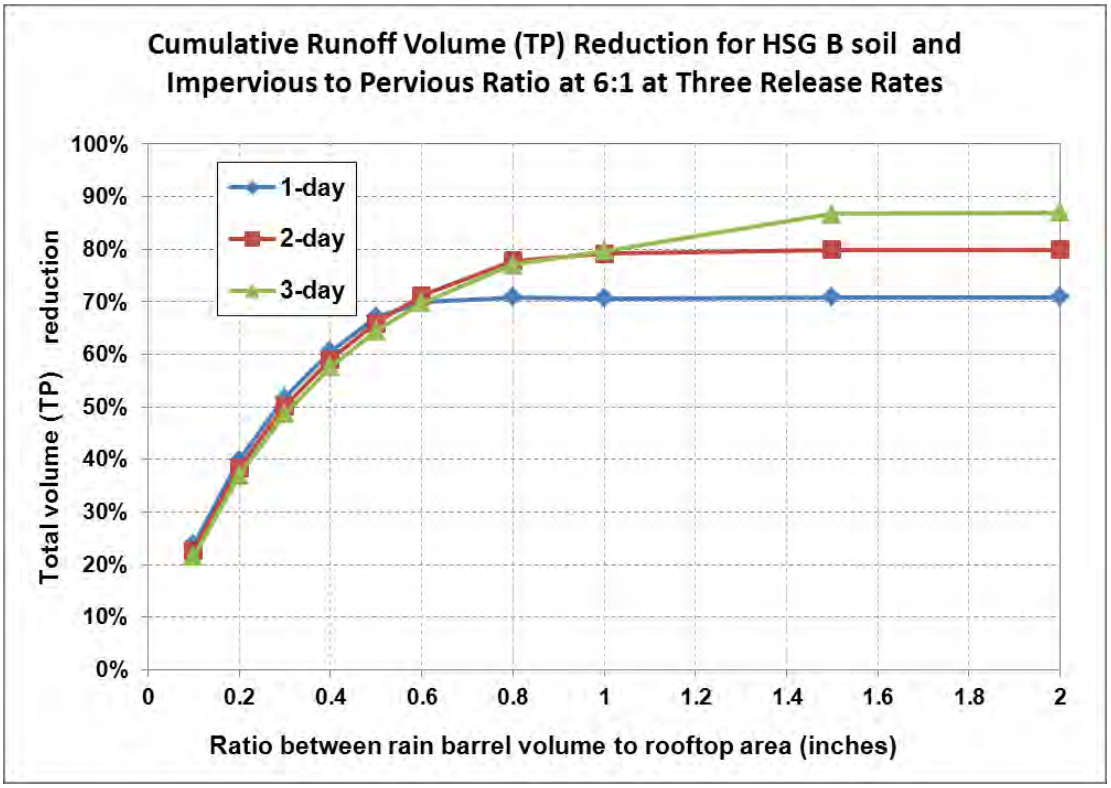


Figure 3- 24: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1 for HSG C Soils

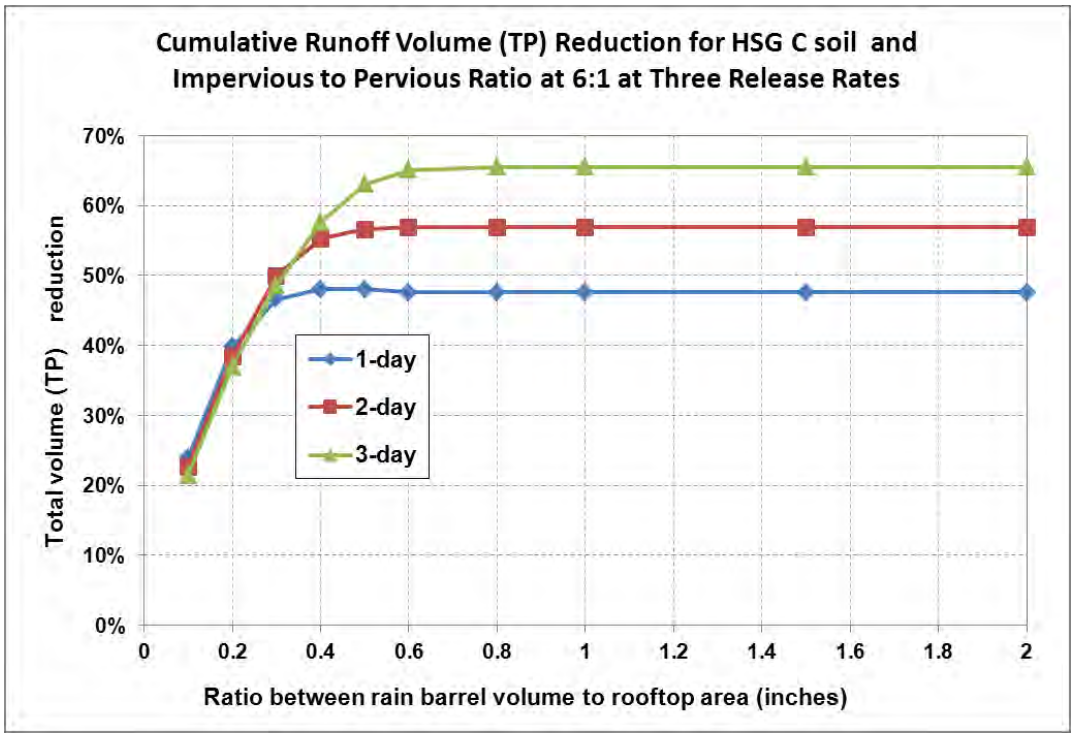


Figure 3- 25: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 6:1 for HSG D Soils

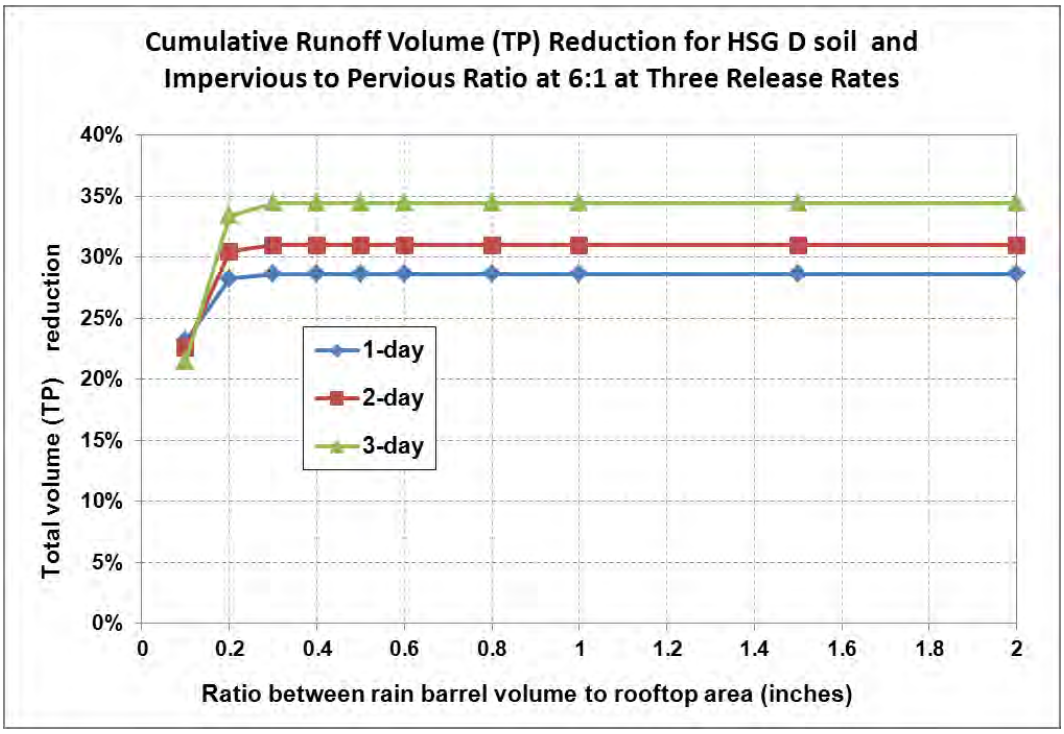


Table 3- 24: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1

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

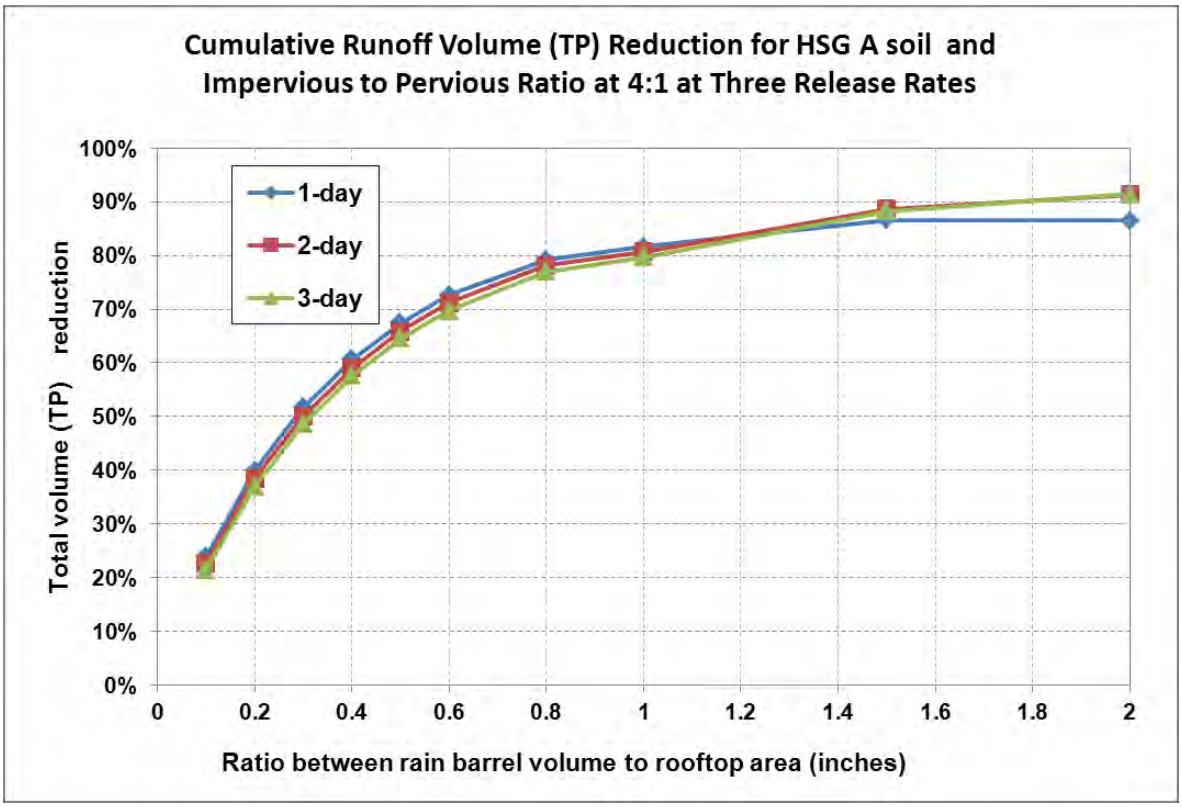


Figure 3- 27: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1 for HSG B Soils

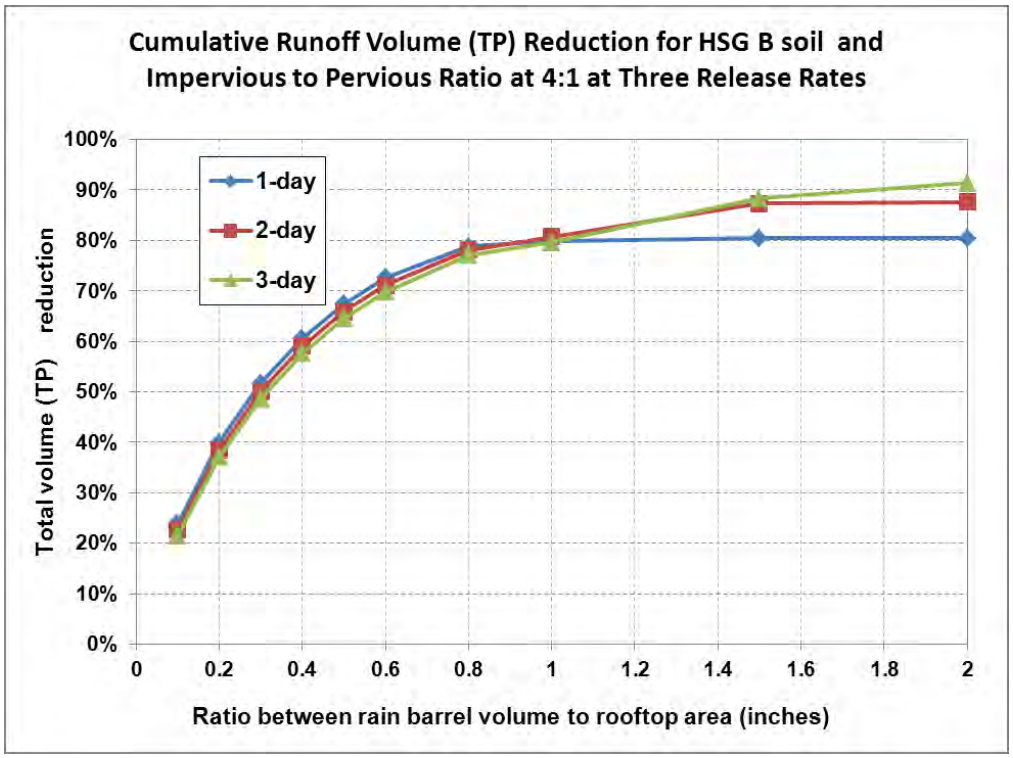


Figure 3- 28: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1 for HSG C Soils

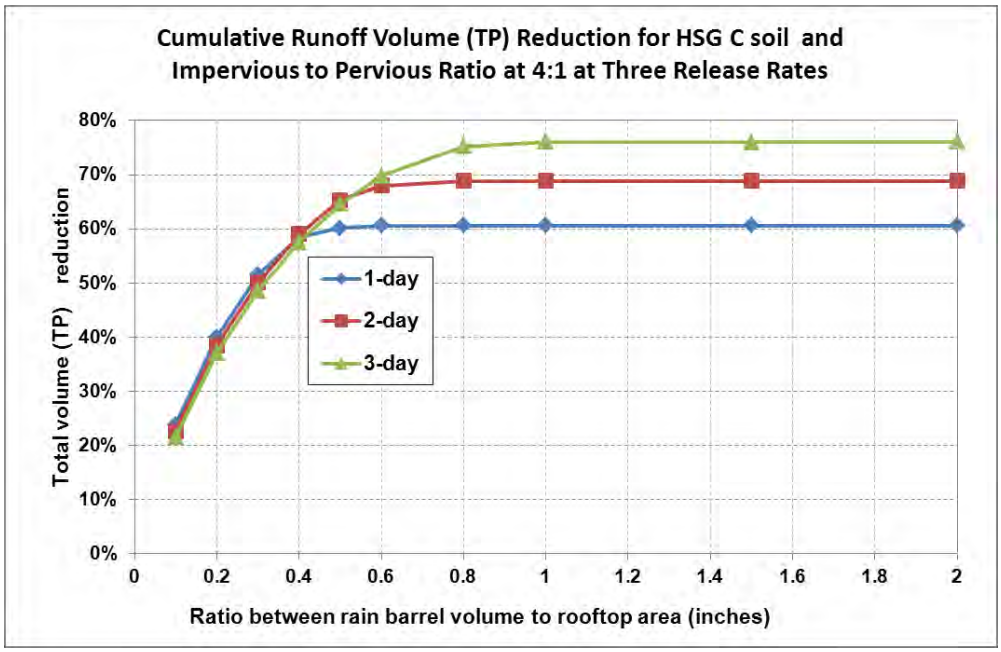


Figure 3- 29: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 4:1 for HSG D Soils

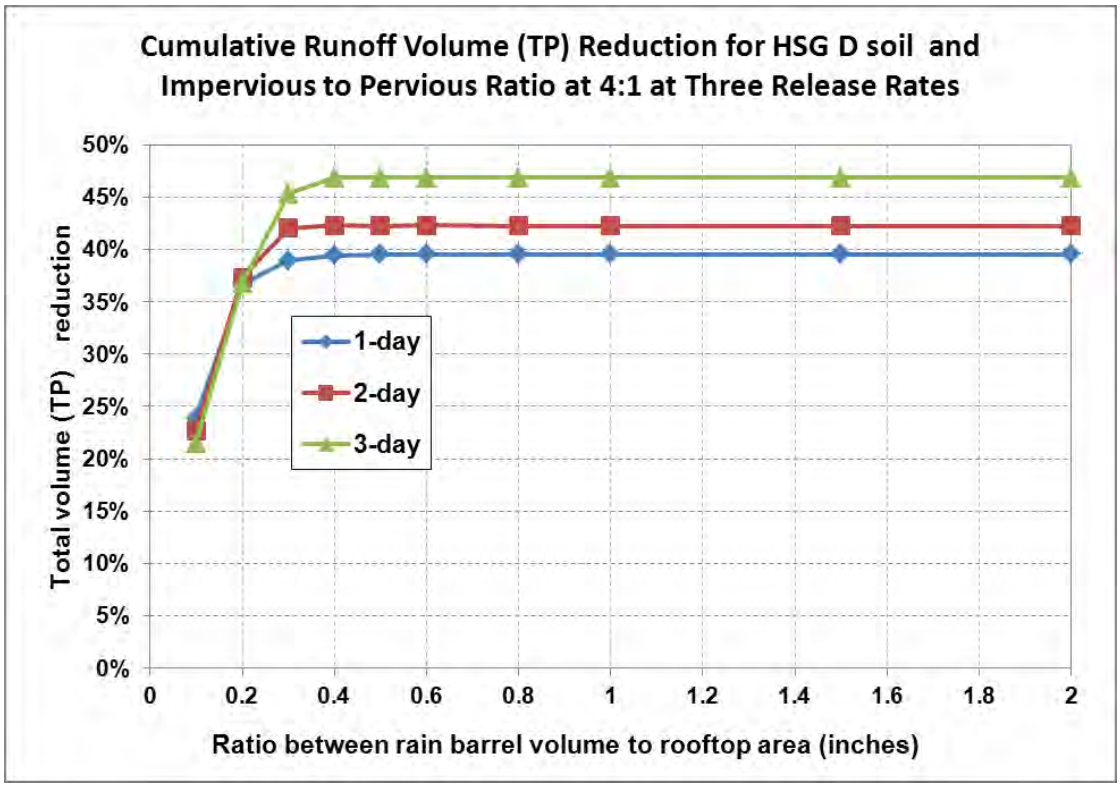


Table 3- 25: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 2:1

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

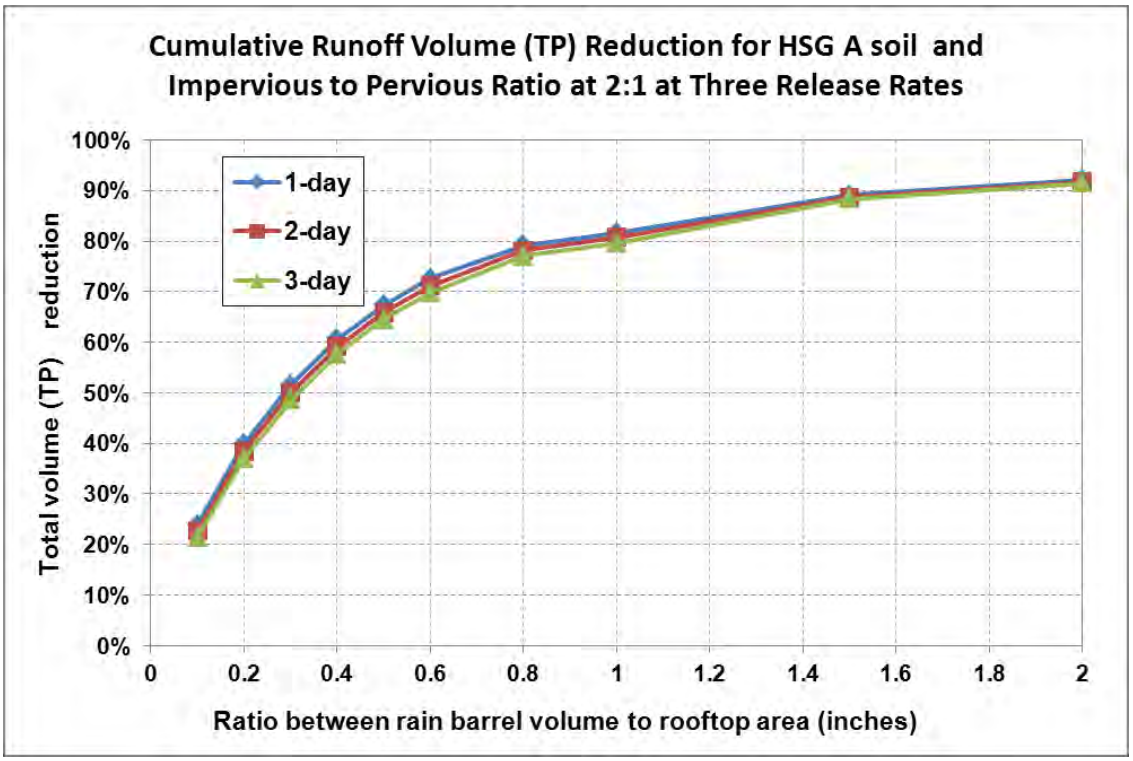


Figure 3- 31: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio= 2:1 for HSG B Soils

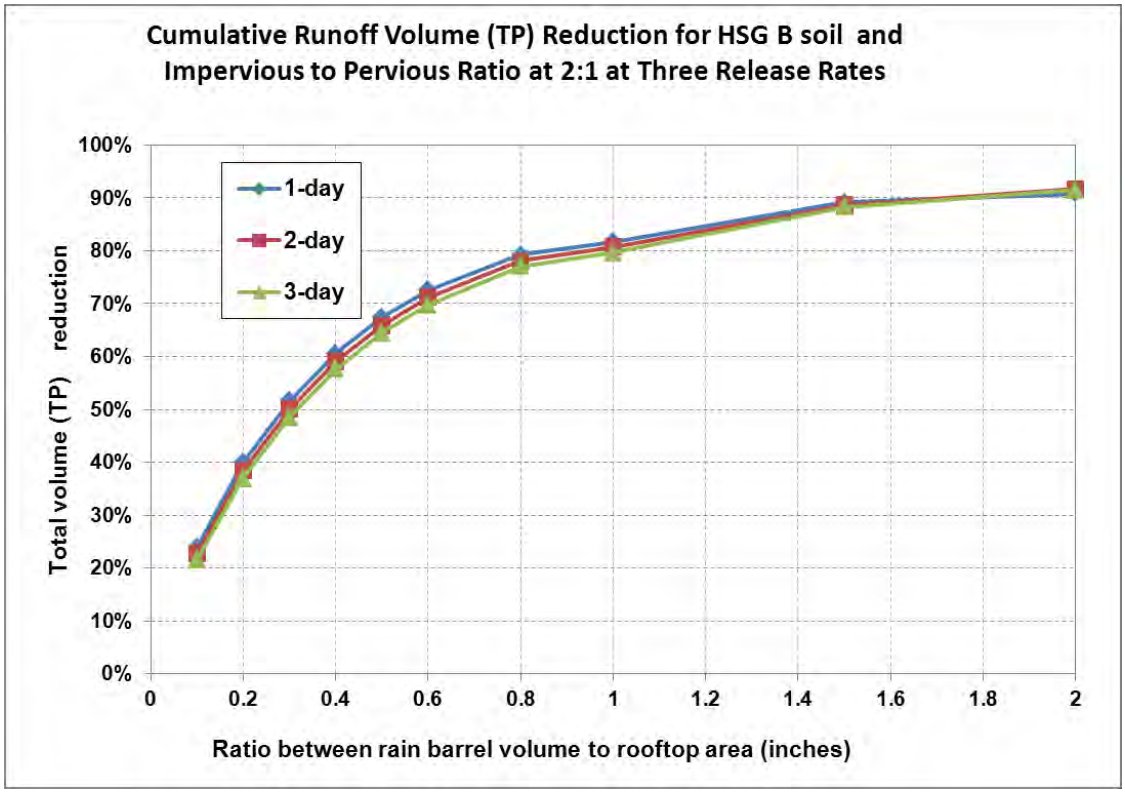


Figure 3- 32: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio= 2:1 for HSG C Soils

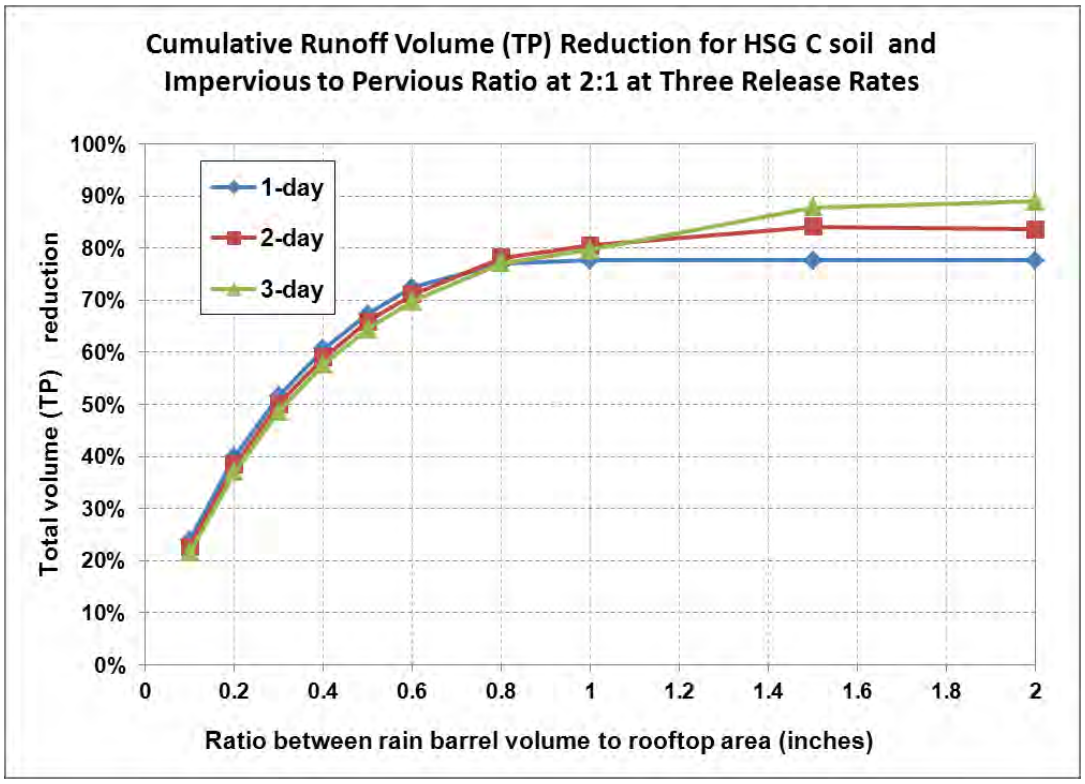


Figure 3- 33: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio= 2:1 for HSG D Soils

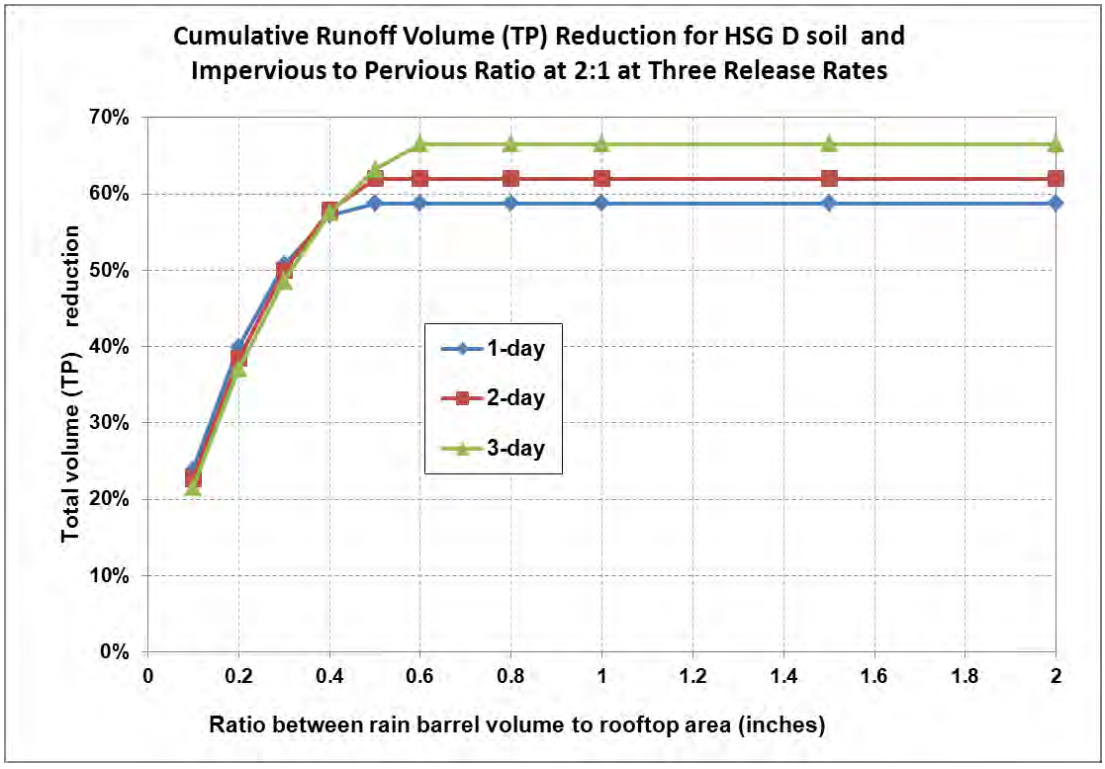


Table 3- 26: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1

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

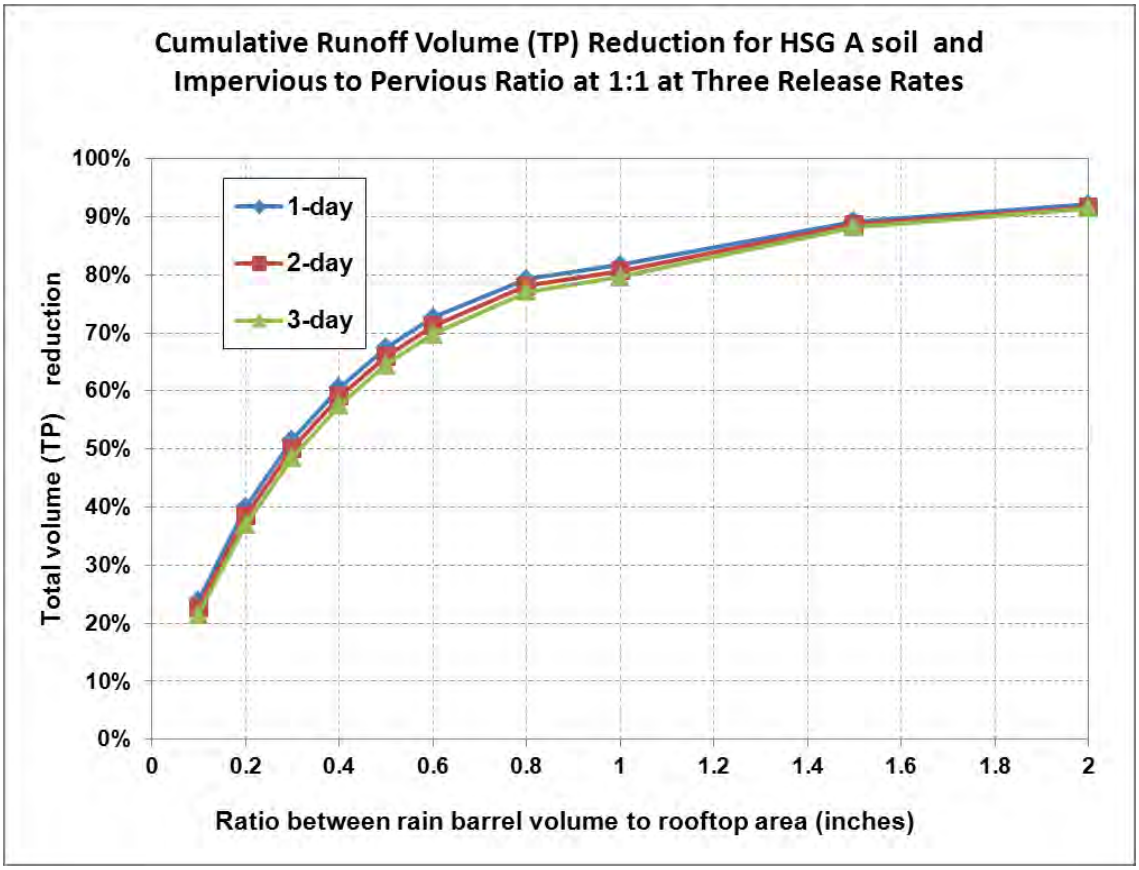


Figure 3- 35: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1 for HSG B Soils

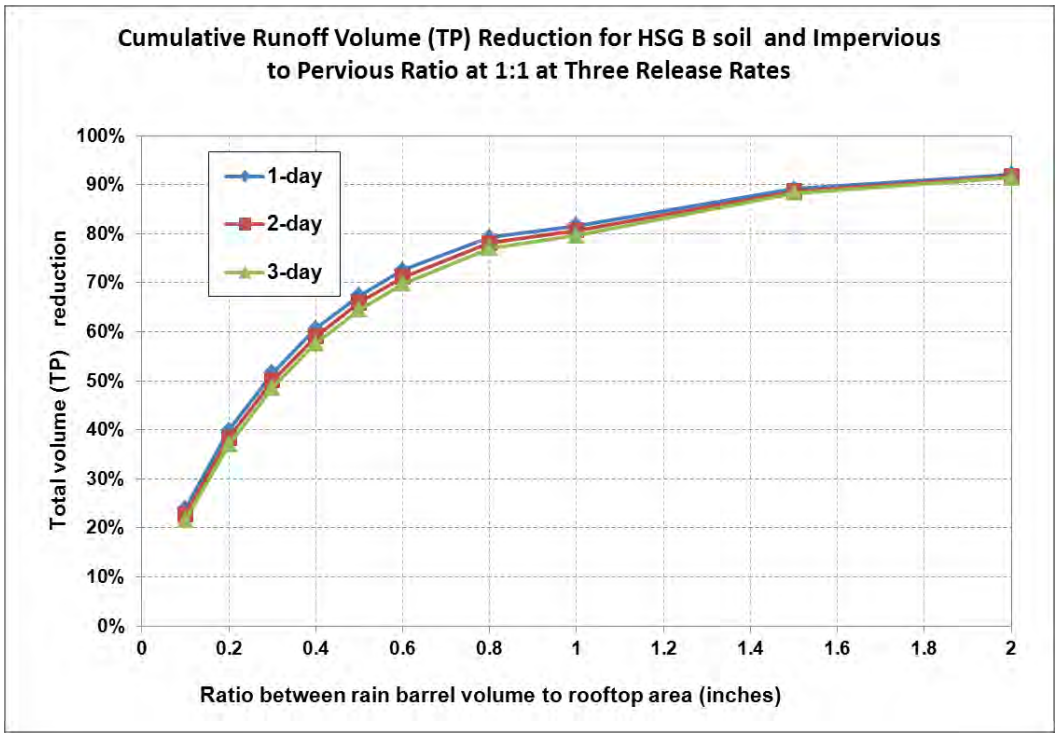


Figure 3- 36: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1 for HSG C Soils

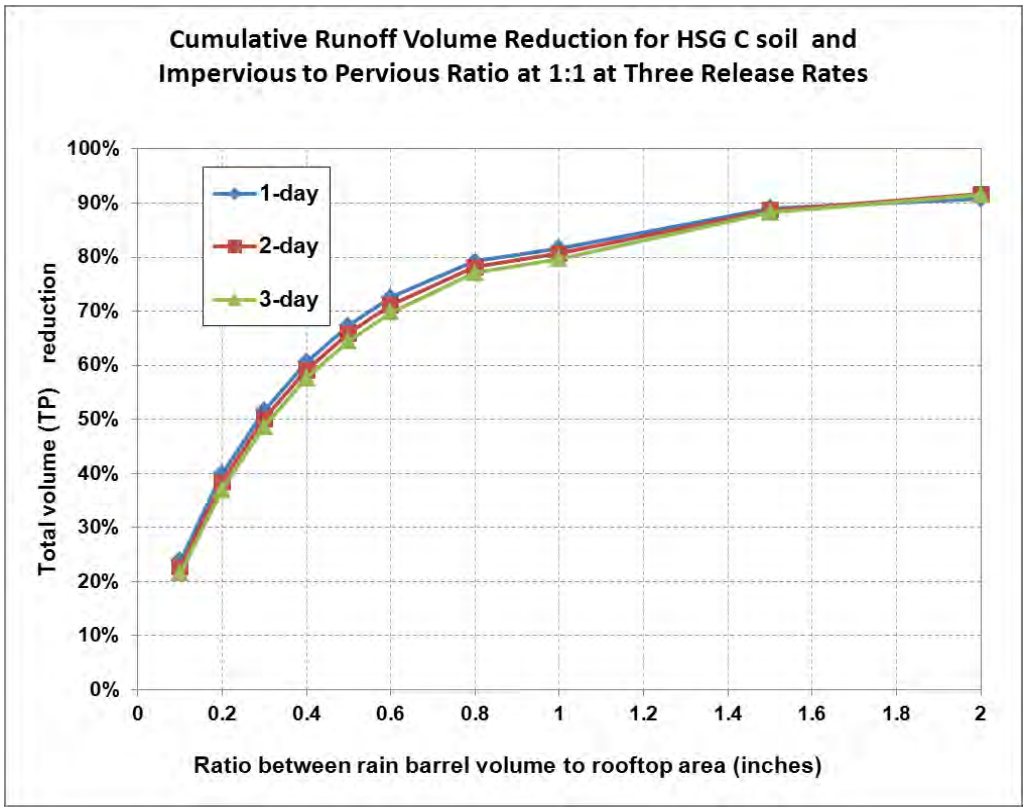


Figure 3- 37: Impervious Area Disconnection through Storage: Impervious Area to Pervious Area Ratio = 1:1 for HSG D Soils

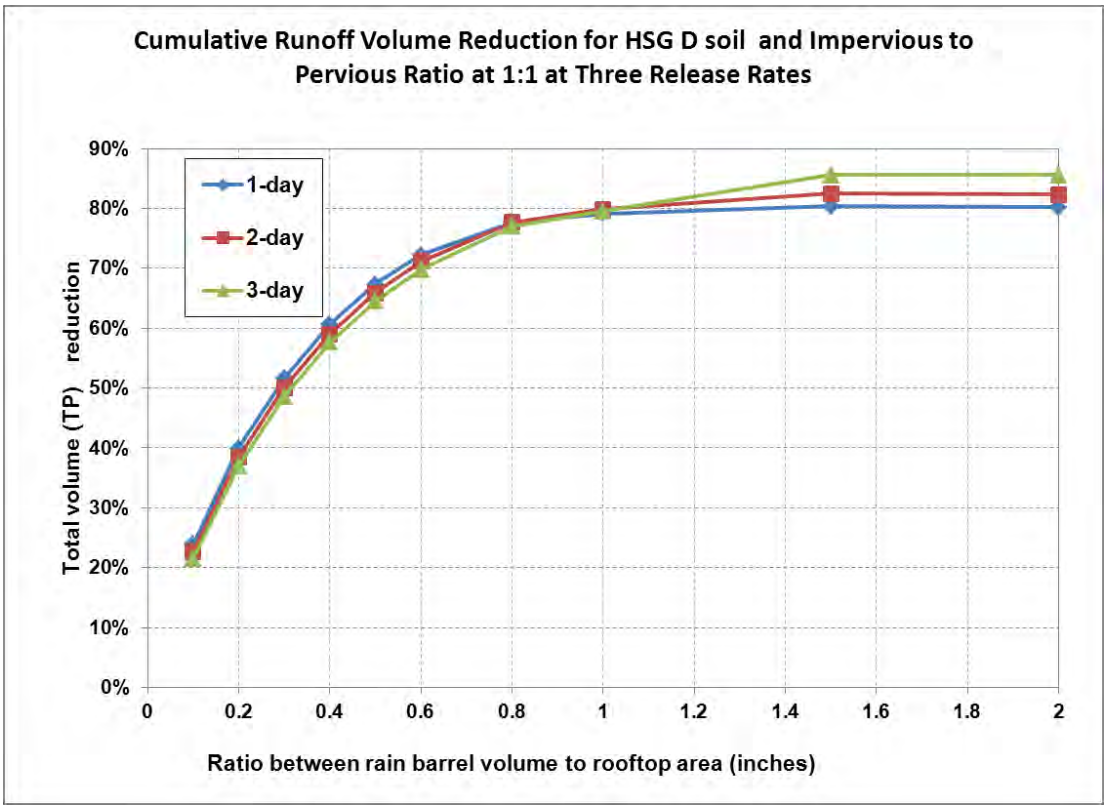


Table 3- 27: Impervious Area Disconnection Performance Table

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

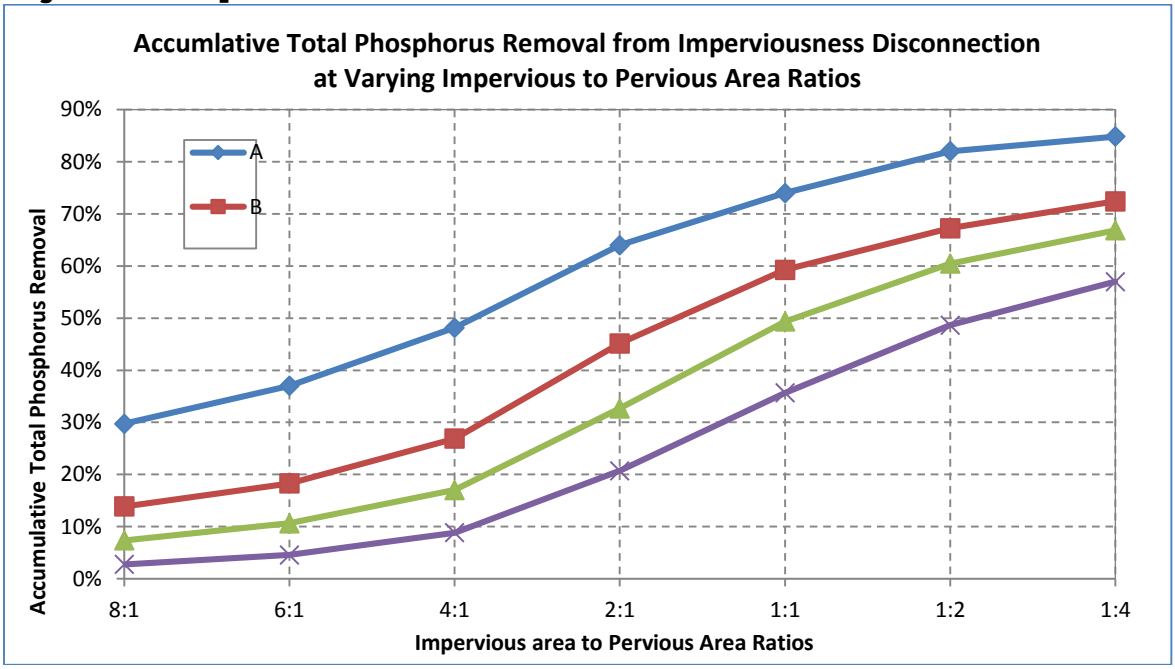


Table 3- 28: Performance Table for Conversion of Impervious Areas to Pervious Area based on Hydrological Soil Groups

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%

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
Infiltration Trench	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 x W x D_{stone} x n_{stone})+ (L x W x D_{sand} x n_{sand})
Subsurface Infiltration	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 x W x $D)_{galley}$ + (L x W x D_{stone} x n_{stone})
Surface Infiltration	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 x ((W_{bottom}+$W_{top@Dmax}$)/2) x D)
Rain Garden/Bio-retention (no underdrains)	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} x D_{pond}) + (A_{soil} x D_{soil} x $n_{soil\ mix}$)
Tree Filter (no underdrain)	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 x W x $D_{ponding}$) + (L x W x D_{soil} x $n_{soil\ mix}$)
Bio-Filtration (w/underdrain)	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 under-drain 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 x W x $D_{ponding}$)+ (L x W x D_{soil} x n_{soil})
Gravel Wetland	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 = ($A_{pretreatment}$ x $D_{preTreatment}$)+ ($A_{wetland}$ x $D_{ponding}$)+ (A_{ISR} x D_{gravel} x n_{gravel})
Porous Pavement with subsurface infiltration	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 x W x D_{stone} x n_{stone})
Porous pavement w/ impermeable underliner w/underdrain	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}
Wet Pond	Provides treatment of runoff through routing through permanent pool.	Wet Pond	DSV= Permanent pool volume prior to high flow bypass DSV=A_{pond} x D_{pond} (does not include pretreatment volume)
Extended Dry Detention Basin	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} x D_{pond} (does not include pretreatment volume)
Dry Water Quality Swale/Grass Swale	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=Lswale x Aswale
Definitions: 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; **Infiltration rate** = 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_5	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, Myriophyllum spicatum	NMR	---
Zebra mussel, Dreissena polymorph	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. 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 Nitrogen Source Identification Report that are within the drainage area of the impaired 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 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 3 of Attachment 1 to Appendix H already existing or installed in the regulated area by the permittee or its agents shall be tracked and the permittee shall estimate the nitrogen removal by the BMP consistent with Attachment 1 to Appendix H. The 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.

2. At any time during the permit term the permittee may be relieved of additional requirements in Appendix H part I.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 nitrogen 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 nitrogen 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 I.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 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[1] 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

[1] 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[2] 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

[2] 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[3]. 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

[3] 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 $_{IA}$) and the pervious area (N Load $_{PA}$) 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
Ponding	Maximum depth	0.33 ft
	Surface area	645 ft^2
Soil mix	Depth	2.0 ft
	Porosity	0.24
	Hydraulic conductivity	2.5 inches/hour
Stone Reservoir (ISR)	Depth	2.50 ft
	Porosity	0.42
	Hydraulic conductivity	500 inches/hour
ISR Volume: System Storage Volume	Ratio	0.56
Orifices	Diameter	12 in
		Installed 2.5 above impermeable soil layer

Determine:

A) Percent nitrogen load reduction (BMP Reduction $_{\%\text{-}N}$) 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 $_{lbs\text{-}N}$)

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^3) of the bio-filtration w/ISR system (BMP-Volume $_{BMP\text{-}ft^3}$) 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:

BMP-Volume $_{BMP\text{-}ft^3}$ =Surface area x (pond maximum depth + (soil mix depth x soil mix porosity) + stone reservoir depth x gravel layer porosity))
= 520 ft^2 x (0.33 ft + (2.0ft x 0.24) + (2.5 ft x 0.42))
= 1,200 ft^3

3) The available storage volume capacity of the bio-filtration w/ISR system in inches of runoff from the contributing impervious area (BMP-Volume $_{IA\text{-}in}$) is calculated using equation 1:

BMP-Volume $_{IA\text{-}in}$ = (BMP-Volume $_{ft^3}$/ IA (acre) x 12 in/ft x 1 acre/43560 ft^2 **(Equation 1)**

Example 1 Continued:

BMP-Volume $_{IA\text{-}in}$ = (1,200 ft^3/1.49 acre) x 12 in/ft x 1 acre/43560 ft^2
= 0.22 in

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

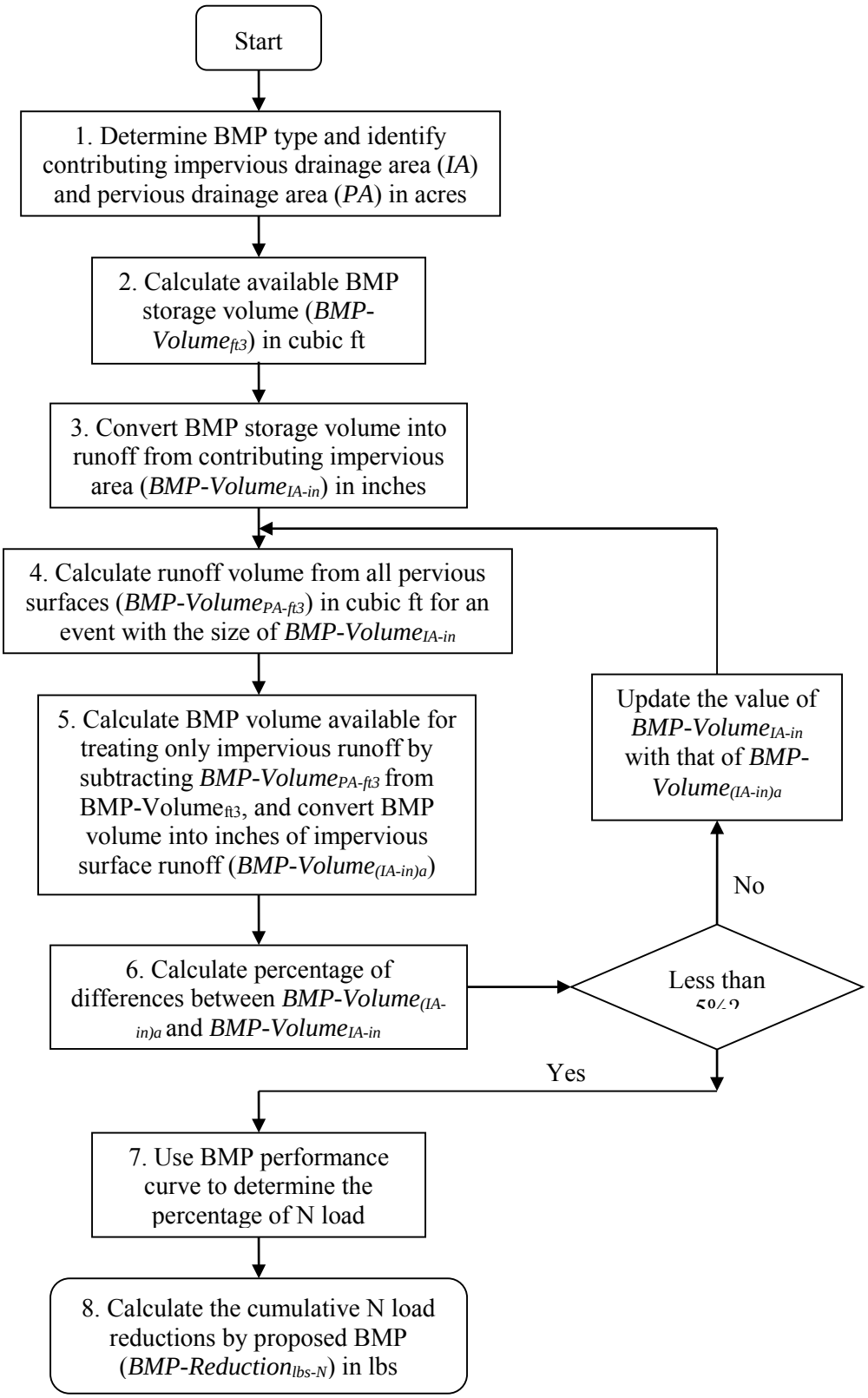
5) Calculate the nitrogen load reduction in pounds of nitrogen for the bio-filtration w/ISR system (BMP Reduction $_{lbs\text{-}N}$) using the BMP Load calculation method shown above in Example 1 and the BMP Reduction $_{\%\text{-}N}$ determined in step 4 by using equation 2.

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

BMP Load = IA (acre) x 14.1 lb/ac/yr
= 1.49 acres x 14.1 lbs/acre/yr
= 21.0 lbs/yr

BMP Reduction $_{lbs\text{-}N}$ = BMP Load x (BMP Reduction $_{\%\text{-}N}$/100) **(Equation 2)**
BMP Reduction $_{lbs\text{-}N}$ = 21 lbs/yr x (61/100)
= **12.8 lbs/yr**

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^3) of the structural BMP (BMP-Volume $_{ft^3}$) using the BMP dimensions and design specifications (e.g., maximum storage depth, filter media porosity);

3) To estimate the nitrogen load reduction of a BMP with a known storage volume capacity, it is first necessary to determine the portion of available BMP storage capacity (BMP-Volume $_{ft^3}$) 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 imperious area for the unknown rainfall depth of *i* inches (see equation 4):

$$\text{BMP-Volume}_{ft^3} = \text{BMP-Volume}_{(IA\text{-}ft^3)i} + \text{BMP-Volume}_{(PA\text{-}ft^3)i} \quad \textbf{(Equation 3)}$$

Where:

BMP-Volume $_{ft^3}$	= the available storage volume of the BMP
BMP-Volume $_{(IA\text{-}ft^3)i}$	= 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 $_{(PA\text{-}ft^3)i}$	= 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 $_{(IA\text{-}ft^3)i}$:

$$\text{BMP-Volume}_{(IA\text{-}ft^3)i} = \text{BMP-Volume}_{ft^3} - \text{BMP-Volume}_{(PA\text{-}ft^3)i} \quad \textbf{(Equation 4)}$$

To determine BMP-Volume $_{(IA\text{-}ft^3)i}$, 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 $_{ft^3}$). 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 $_{ft^3}$ determined in step 2 into inches of runoff from the contributing impervious area (BMP Volume $_{(IA\text{-}in)1}$) using equation 5.

$$\text{BMP-Volume}_{(IA\text{-}in)1} = (\text{BMP-Volume}_{ft^3} / \text{IA (acre)}) \times (12 \text{ in/ft} / 43{,}560 \text{ ft}^2/\text{acre}) \quad \textbf{(Equation 5)};$$

For iterations 2 through n (2…n), convert the BMP Volume $_{(IA\text{-}ft^3)2\ldots n}$, determined in step 5a below, into inches of runoff from the contributing impervious area (BMP Volume $_{(IA\text{-}in)2\ldots n}$) using equation 6.

$$\text{BMP-Volume}_{(IA\text{-}in)2\ldots n} = (\text{BMP-Volume}_{(IA\text{-}ft^3)2\ldots n} / \text{IA (acre)}) \times (12 \text{ in/ft} / 43{,}560 \text{ ft}^2/\text{acre}) \quad \textbf{(Equation 6)};$$

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^3) from the contributing PA (BMP Volume

$_{PA\text{-}ft^3}$) for a rainfall size equal to the sum of BMP-Volume $_{(IA\text{-}in)1}$, determined in step 3. The runoff volume for each distinct pervious area must be determined.

BMP Volume $_{(PA\text{-}ft^3)1...n} = \sum$ ((PA x (runoff depth)$_{(PA1, PA2..PAn)}$ x (3,630 ft^3/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 $_{PA\text{-}ft^3}$, 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):

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

BMP-Volume $_{(IA\text{-}in)2}$ = (BMP-Volume $_{(IA\text{-}ft^3)2}$/IA (acre)) x (12 in/ft x 1 acre/43,560 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 $_{(IA\text{-}in)3..n+1}$) by subtracting BMP Volume $_{(PA\text{-}ft^3)2..n}$, determined in step 4, from BMP Volume $_{(IA\text{-}ft^3)3..n+1}$, 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 $_{(IA\text{-}in)a}$ to BMP Volume $_{(IA\text{-}in)a\text{-}1}$ determined from the previous iteration (a-1). If the difference in these values is greater than 5% of BMP Volume $_{(IA\text{-}in)a}$ then repeat steps 4 and 5, using BMP Volume $_{(IA\text{-}in)a}$ as the new starting value for the next iteration (a+1). If the difference is less than or equal to 5 % of BMP Volume $_{(IA\text{-}in)a}$ then the permittee may proceed to step 7.

7) Determine the % nitrogen load reduction for the structural BMP (BMP Reduction $_{\%\text{-}N}$) using the appropriate BMP curve on Figure 1 or 2 and the BMP-Volume $_{(IA\text{-}in)n}$ 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 $_{lbs\text{-}N}$) using the BMP Load as calculated above in Example 1 and the percent nitrogen load reduction (BMP Reduction $_{\%\text{-}N}$) determined in step 7 by using equation 10:

BMP Reduction $_{lbs\text{-}N}$ = BMP Load x (BMP Reduction $_{\%\text{-}N}$/100) **(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^3)	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 $_{\%\text{-}N}$) 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 $_{lbs\text{-}N}$)

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^3) of the infiltration basin (BMP-Volume $_{ft^3}$) is determined from the design details and basin dimensions; BMP-Volume $_{ft^3} = 48{,}155\ ft^3$.

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$_{ft^3}$ is converted into inches of runoff from the contributing impervious area (BMP Volume $_{(IA\text{-}in)1}$) using equation 5.

$$\text{BMP Volume}_{(IA\text{-}in)1} = (48{,}155\ ft^2 / 11.75\ \text{acre}) \times (12\ \text{in/ft} / 43{,}560\ ft^2/\text{acre})$$
$$= 1.13\ \text{in}$$

Solution Continued:

4-1) The total volume of runoff (ft^3) from the contributing PA (BMP Volume $_{PA\text{-}ft^3}$) for a rainfall size equal to the sum of BMP Volume $_{(IA\text{-}in)1}$ 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.

BMP Volume $_{(PA\text{-}ft^3)1}$ = ((3.84 acre x (0.33 in) + (0.96 acre x (0.13 in)) x 3,630 ft^3/acre-in
= 5052 ft^3

5-1) For iteration 1, the portion of BMP Volume that is available to treat runoff from only the IA is estimated by subtracting the BMP Volume $_{(PA\text{-}ft^3)1}$, determined in step 4-1, from BMP Volume$_{ft^3}$, determined in step 2, and converted to inches of runoff from IA:

BMP Volume $_{(IA\text{-}ft^3)\,2}$ = 48,155 ft^3 – 5052 ft^3
= 43,103 ft^3
BMP Volume $_{(IA\text{-}in)\,2}$ = (43,103 ft^3/11.75 acre) x (12 in/ft x 1 acre/43,560 ft^2)
= 1.01 in

6-1) The % difference between BMP Volume $_{(IA\text{-}in)\,2}$, 1.01 in, and BMP Volume $_{(IA\text{-}in)1}$, 1.13 in is determined and found to be significantly greater than 5%:

% Difference = ((1.13 in – 1.01 in)/1.01 in) x 100
= 12%

Therefore, steps 4 through 6 are repeated starting with BMP Volume $_{(IA\text{-}in)\,2}$ = 1.01 in.

Solution Iteration 2

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

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

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

6-2) % Difference = ((1.05 in – 1.01 in)/1.05 in) x 100
= 4%

The difference of 4% is acceptable.

Solution Continued:

7) The % nitrogen load reduction for the infiltration basin (BMP Reduction $_{\%\text{-}N}$) is determined by using the RR treatment curve in Figure 2 and the treatment volume (BMP-Volume $_{\text{Net IA-in}}$ = 1.05 in) calculated in step 5-2 and is **BMP Reduction $_{\%\text{-}N}$ = 56%**.

9) The nitrogen load reduction in pounds of nitrogen (BMP-Reduction $_{\text{lbs-N}}$) 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 $_{\text{target}}$ of 56%.

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

Following example 1, the BMP load is calculated:

BMP N Load = (IA x impervious cover nitrogen export loading rate)
+ ($PA_{HSG\ D}$ x pervious cover nitrogen export loading rate, HSG D
+ ($PA_{HSG\ C}$ x pervious cover nitrogen export loading rate, HSG C)
= (16.55 acre x 15.4 lbs/acre/yr) + (3.84 acre x 3.7 lbs/acre/yr) + (0.96 acre x 2.4 lbs/acre/yr)
= 271.4 lbs/yr

BMP-Reduction $_{\text{lbs-N}}$ = 275.13 lbs/yr x 56/100 = **152.0 lbs/yr**

Figure 1: Regional BMP Performance Curve for Annual Nitrogen Load Removal: System Design by the University of New Hampshire Stormwater Center (UNHSWC)

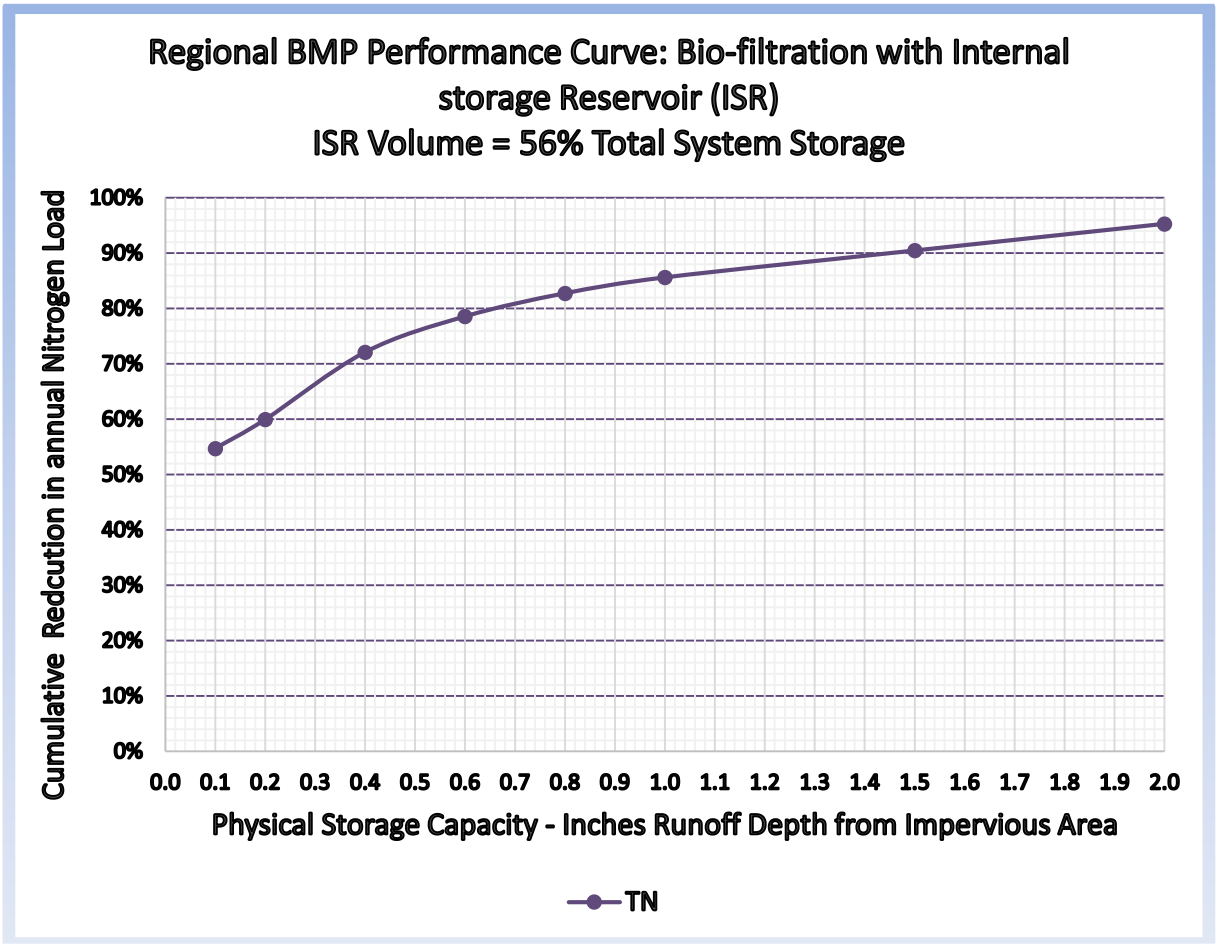
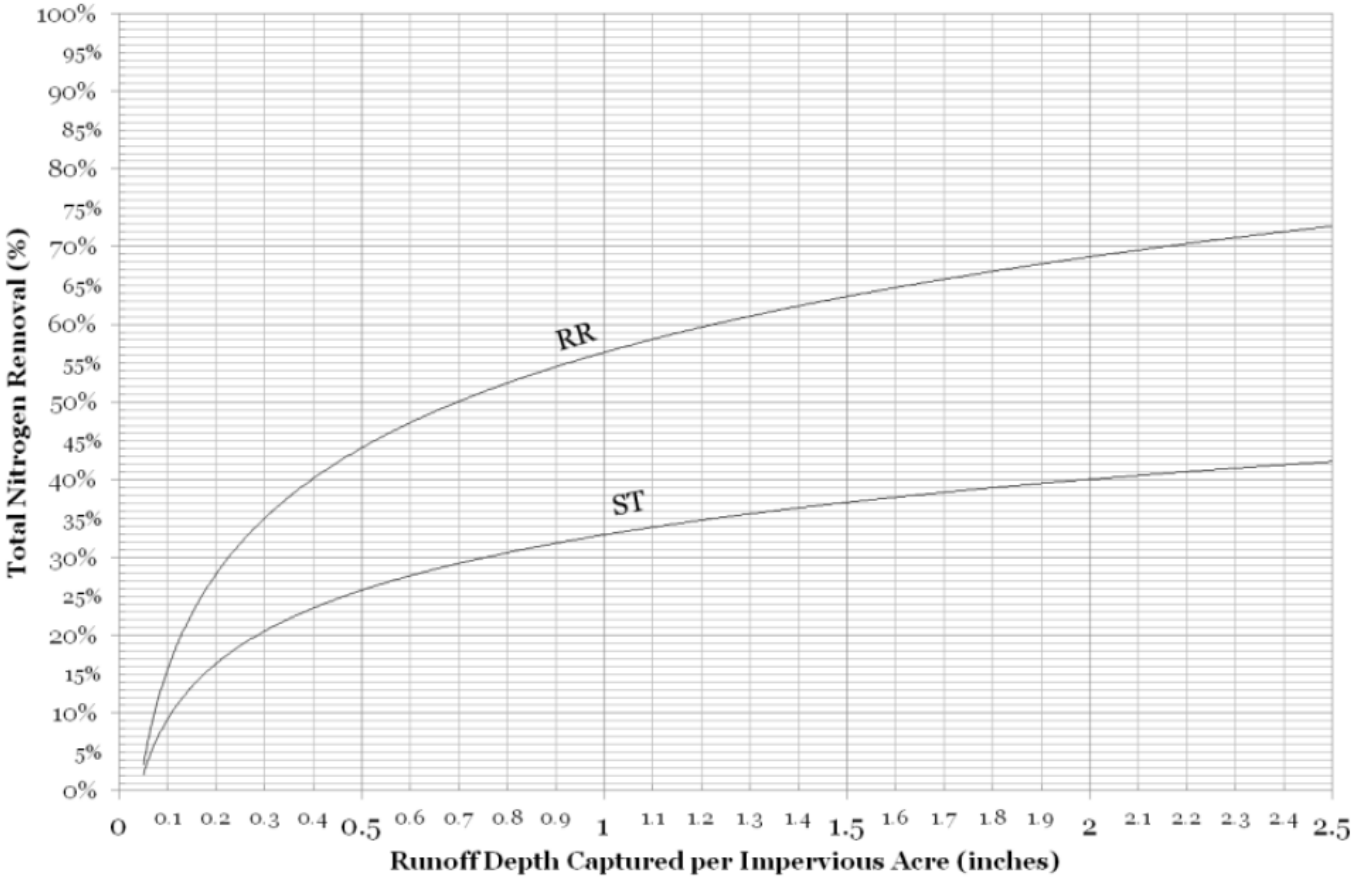


Table 3. Classification of BMP to Determine Nitrogen Reduction[1]

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)

[1]**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

Received 6/29/2018

MASSDEVELOPMENT

99 High Street
Boston, Massachusetts
02110

Tel: 617-330-2000
800-445-8030

Fax: 617-330-2001

www.massdevelopment.com

June 29, 2018

United States Environmental Protection Agency
5 Post Office Square, Suite 100
Mail Code - OEP06-1
Boston, Massachusetts 02109-3912

ATTN: Newton Tedder

Re: Amendment No. 1 to Notice of Intent to be Covered Under National Pollutant Discharge Elimination System Small MS4 General Permit Previously Filed on March 22, 2018

Dear Mr. Tedder:

Please consider this letter an amendment to the Notice of Intent (the "NOI") filed by the Massachusetts Development Finance Agency ("MassDevelopment" or the "Agency"), for the Devens Regional Enterprise Zone ("Devens") to be covered under the United States Environmental Protection Agency National Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts (the "General Permit")[1]. The NOI was previously filed with Environmental Protection Agency ("EPA") on March 22, 2018. The General Permit has an effective date of July 1, 2018.

We respectfully request that the Agency's original NOI submission be amended as set forth below:

Under Part III – Stormwater Management Program Summary, for Minimum Control Measure 5 – Post-Construction Stormwater Management for New Development and Redevelopment, please amend the Best Management Practice (BMP) entitled "Post Construction Stormwater Management Regulations" as follows. In the original submission, the BMP Description included a commitment to "Continue to require compliance with the Devens Enterprise Commission (DEC) regulatory requirements for post-construction runoff from new development and re-development as included

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lieutenant Governor

JAY ASH
Chairman

LAUREN A. LISS
President and CEO

[1] The Agency has applied for coverage under the General Permit signed by EPA and the Massachusetts Department of Environmental Protection on April 4, 2016, as it may be amended prior to its effective date.

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in 974 CMR 4.08 and 974 CMR 4.09." We are hereby amending this description to add "and to comply with any federal permit requirements."

The Devens Enterprise Commission currently has its own regulations in place (974 CMR 4.08 (Stormwater Management) and 4.09 (Water Resource Protection Overlay Districts)), which outline regulatory requirements for post-construction stormwater management. The Devens Enterprise Commission will also ensure compliance with any federal requirements of the permit, where applicable, such as EISA Section 438, which includes stormwater runoff requirements for federal development projects. Please note, however, that not all land within the Devens Enterprise Zone is under the jurisdiction of the Devens Enterprise Commission. Some land currently remains under the control of one of the following federal entities: the Department of Defense, the Department of Interior or the Department of Justice.

We look forward to your prompt authorization and would be pleased to answer any questions you may have or provide any additional information you require. If you have any questions regarding this amendment to the NOI, please contact John Marc-Aurele at 978-772-2926.

Kindly acknowledge receipt of this amendment by date stamping the enclosed copy of this letter and returning it to the messenger.

Sincerely,

Lauren A. Liss
President and Chief Executive Officer

cc: Robert M. Ruzzo, Deputy Director and General Counsel
John Marc-Aurele, Engineering Manager

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

Received
3/22/18

MASSDEVELOPMENT

99 High Street
Boston, Massachusetts
02110

Tel: 617-330-2000
800-445-8030

Fax: 617-330-2001

www.massdevelopment.com

March 22, 2018

Via Hand Delivery

United States Environmental Protection Agency
5 Post Office Square, Suite 100
Mail Code - OEP06-1
Boston, Massachusetts 02109-3912

ATTN: Newton Tedder

Re: Notice of Intent to be Covered Under National Pollutant Discharge Elimination System Small MS4 General Permit

Dear Mr. Tedder:

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lieutenant Governor

JAY ASH
Chairman

LAUREN A. LISS
President and CEO

I enclose on behalf of the Massachusetts Development Finance Agency (the "Agency") a Notice of Intent (the "NOI") for the Devens Regional Enterprise Zone ("Devens") to be covered under the United States Environmental Protection Agency National Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts (the "Permit")[1].

After serving as the U.S. Army's New England Headquarters for 79 years, Fort Devens was closed in 1996. With the endorsement of the voters in the host towns of Ayer, Harvard, and Shirley, and with the approval of the Commonwealth, a significant portion of the property was conveyed to the Agency (via the Massachusetts Government Land Bank, a predecessor-in-interest to the Agency). The Agency is tasked by the legislature with, among other things, (a) providing and maintaining certain municipal infrastructure within Devens and (b) strengthening the local economy of Devens, the Devens region and Massachusetts at large. For 20 years, the Agency has led the successful redevelopment of Devens by creating an award-winning, sustainable, and diverse business and residential community.

Based on the MS4 Permit Improvement Guide issued by the EPA in April of 2010, the Agency believes that Devens may be a regulated Small Municipal Separate Storm Sewer System ("MS4"). In accordance with section 1.2.1 of the Permit, Devens:

[1] The Agency is applying for the Permit signed by EPA and the Massachusetts Department of Environmental Protection on April 4, 2016, as it may be amended prior to its effective date.

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1. has a separate storm sewer owned and operated by a public body created by or pursuant to state law, having jurisdiction over sewage, stormwater or other wastes;

2. is not a large or medium MS4;

3. is located partially within urbanized areas as determined by the 2010 Census; and

4. is located in a geographic area designated by the EPA as "automatically designated MS4 areas." In this regard, I note that although Devens was not separately designated by EPA and has not received any notice from either EPA or the Commonwealth of Massachusetts that it is required to file for a stormwater permit, a portion of the geographic area of Devens is included among EPA's "NPDES Phase II Stormwater Program Automatically Designated MS4 Areas" on the base maps for the towns of Ayer, Shirley, and Harvard, Massachusetts (based upon the 2010 census).

Notwithstanding the uncertainty as to whether Devens is a regulated small MS4, as part of its commitment to environmental stewardship and sustainability, the Agency was prepared to submit an NOI in 2017 but postponed that submission due to EPA's announcement on June 29, 2017 that it was delaying the effective date of the Permit from July 1, 2017 to July 1, 2018. As you will see from the enclosed NOI, despite the delayed effective date, MassDevelopment, acting in concert with the Devens Enterprise Commission ("DEC" which acts as the regulatory and permitting authority for Devens) has already met or exceeded many of the requirements of the Permit. Moreover, the Agency's NOI proposes deadlines that are more aggressive than the Permit requires. Regardless, the Agency stands ready and is eager to comply with the terms of the Permit when it becomes effective.

We look forward to your prompt authorization and would be pleased to answer any questions you may have or provide any additional information you require. If you have any questions regarding this NOI, please contact John Marc-Aurele at 978-772-2926.

Kindly acknowledge receipt by date stamping the enclosed copy of this letter and returning it to the messenger.

Sincerely,

Lauren A. Liss
President and Chief Executive Officer

cc: Robert Ruzzo, Deputy Director and General Counsel
John Marc-Aurele, Engineering Manager

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

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

Part I: General Conditions

General Information

Name of Municipality or Organization: Devens/Massachusetts Development Finance Agency State: MA

EPA NPDES Permit Number (if applicable): N/A

Primary MS4 Program Manager Contact Information

Name: John P. Marc-Aurele Title: Engineering Manager

Street Address Line 1: 33 Andrews Parkway

Street Address Line 2:

City: Devens State: MA Zip Code: 01434

Email: JMarc-Aurele@Massdevelopment.com Phone Number: (978) 784-2926

Fax Number: (978) 772-7496

Other Information

Stormwater Management Program (SWMP) Location (web address or physical location, if already completed): To Be Completed During Permit Year 1 and Posted to Devens Community Website (2018-2019).

Eligibility Determination

Endangered Species Act (ESA) Determination Complete? Yes

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

National Historic Preservation Act (NHPA) Determination Complete? No

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

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

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

Part II: Summary of Receiving Waters

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

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

Check off relevant pollutants for discharges to impaired waterbodies (see above 303(d) lists) without an approved TMDL in accordance with part 2.2.2.a of the permit. List any other pollutants in the last column, if applicable.

Waterbody segment that receives flow from the MS4	Number of outfalls into receiving water segment	Chloride	Chlorophyll-a	Dissolved Oxygen/ DO Saturation	Nitrogen	Oil & Grease/ PAH	Phosphorus	Solids/ TSS/ Turbidity	E. coli	Enterococcus	Other pollutant(s) causing impairments
Nashua River (Segment MA-81-05)	13	☐	☐	☐	☐	☐	☒	☐	☒	☐	Aquatic Macroinvertebrate Bioassessments; Sediment Bioassays - Acute Toxicity Freshwater
Wetlands Area Near the Nashua River	4	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetlands Area Off MacPherson Road	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Unnamed Stream Tributary to Mirror Lake	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	Mercury in Fish Tissue
Unnamed Stream & Wetlands Near Rte. 2A	3	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Outfalls to Detention Basins to Swales to Plow Shop Pond	7	☐	☐	☐	☐	☐	☐	☐	☐	☐	Non-Native Aquatic Plants, Aquatic Plants (Macrophytes), Arsenic, Chromium (total), Mercury in Fish Tissue, Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems), Sediment Bioassays - Chronic Toxicity Freshwater
Willow Branch	19	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetlands Area Off Lake George Street	3	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Bowers Brook	7	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Cold Spring Brook	10	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Unnamed Water Body Off Saratoga Street	2	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Unnamed Stream Off Patton Road	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Unnamed Stream/Wetlands Area Off Queenstown St.	4	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Unnamed Stream/Wetlands Area Off Elm Rd.	3	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Unnamed Stream Off Spruce Street	7	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Catacoonamug Brook (MA81-74)	5	☐	☐	☐	☐	☐	☐	☐	☒	☐	
Trout Brook	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	☐	

Click to lengthen table

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 Imple-mentation**
Brochures/Pamphlets	Provide general stormwater educational pamphlets as well as topic specific pamphlets addressing lawn care, pet waste, etc.	Residents	Massachusetts Development Finance Agency ("MassDevelopment") (	Distribute 2 pamphlets per year to residents.	2018
Brochures/Pamphlets	Provide general stormwater educational pamphlets as well as topic specific pamphlets addressing lawn/grounds maintenance, use of salt/de-icing materials and other facility specific materials, etc.	Businesses, Institutions and Commercial Facilities	Devens Enterprise Commission (DEC)/MassDevelopment (Engineerin	Distribute 2 pamphlets per year to businesses, institutions and commercial facilities.	2018

Brochures/Pamphlets	Distribute brochures to prospective developers and contractors providing general information on stormwater management and summary information on Devens rules and regulations.	Developers/Contractors (construction)	Devens Enterprise Commission / Mass Development (Engineering & D	Distribute brochure throughout permit term and maintain a list of all recipients.	2018
Brochures/Pamphlets	Distribute brochures to industrial facilities providing general information on stormwater management and summary information on Devens rules and regulations.	Industrial Facilities	Mass Development(Engineering)/Devens Enterprise Commission	Distribute brochure throughout permit term and maintain a list of all recipients.	2018
Web Page	Provide new/updated Devens website to provide public access to stormwater-related materials, documentation and procedures.	Residents	MassDevelopment (Operations/Engineering)	Update the website during Year 1 and track the number of visits to the website annually thereafter.	2018
Web Page	Provide new/updated Devens web site and update Devens Enterprise Commission website to provide access to stormwater-related materials, documentation, regulations and procedures.	Businesses, Institutions and Commercial Facilities	MassDevelopment (Operations/Engineering)/DEC	Update the website during Year 1 and track the number of visits to the website annually thereafter.	2018

Web Page	Provide new/updated Devens web site and update Devens Enterprise Commission website to provide access to stormwater-related materials, documentation, regulations and procedures.	Developers (construction)	MassDevelopment Operations/Engineering/DEC	Update the website during Year 1 and track the number of visits to the website annually thereafter.	2018
Web Page	Provide new/updated Devens website and update Devens Enterprise Commission website to provide access to stormwater-related materials, documentation, regulations and procedures.	Industrial Facilities	MassDevelopment Operations/Engineering/DEC	Update the website during Year 1 and track the number of visits to the website annually thereafter.	2018
School Curricula/Programs	Develop/distribute stormwater-related educational materials, posters, etc., to local schools for use in classrooms and for general use.	Students	MassDevelopment Operations/Engineering	Distribute materials to local schools annually.	2018
Meeting	Meet with businesses and institutions to review facilities and discuss specific discharge conditions.	Businesses/Institutions/Commercial	MassDevelopment Engineering/DPW and DEC	Meet with businesses and institutions annually.	2018
Meetings & Public Education Materials	Continue to meet and work with the Nashua River Watershed Association to develop and distribute materials to educate the public on protecting the water quality of the Nashua River.	General Public	MassDevelopment Engineering and DEC	Meet and collaborate with the Nashua River Watershed Association annually to educate the general public.	2018

Presentation	Conduct a presentation on Stormwater Operation & Maintenance Plan Requirements	Businesses/Institutions/Commercial	MassDevelopment Engineering and DEC	Make presentation annually and track the number of commercial entities that attend the presentation.	2018
Web Page	Continue to provide information to residents via the MassDevelopment "Devens Community" website and the Devens Enterprise Commission website on "Living Green" including how to reduce water use and reduce waste generated.	Residents	MassDevelopment/Devens Enterprise Commission	Send link to website where information is posted to residents and track number of residents contacted and the number of visits to the website.	2018
Web Page	Continue to provide information to residents via the MassDevelopment "Devens Community" website and the Devens Enterprise Commission website on "Living Green" including how to reduce water use and reduce waste generated.	Businesses/Institutions/Commercial	MassDevelopment/Devens Enterprise Commission	Send link to website where information is posted to local businesses and track number of businesses contacted and the number of visits to the website.	2018

Brochures/Pamphlets	Continue to make available to developers information on green infrastructure guidelines for construction projects in Devens.	Developers (construction)	MassDevelopment/Devens Enterprise Commission	Post information on the Devens Enterprise Commission website and handout information to developers as new development projects are introduced to the Commission - keep a list of developers to which the information is distributed.	2018
Web Page	Continue to make available to operators of industrial facilities information on Best Management Practices focused on stormwater pollution prevention	Industrial Facilities	MassDevelopment/Devens Enterprise Commission	Post information on the Devens Enterprise Commission website and e-mail a link to the information to owners/operators of industrial facilities within Devens. Track the number of owners/operators e-mailed and the number of visits to the website.	2018
	***Additional messaging will be included to meet impaired waters requirements per Part 2.1.1 and Appendix H of the Permit as outlined in Part III and Part IV of this Notice of Intent.				

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

Part III: Stormwater Management Program Summary (continued)

MCM 2: Public Involvement and Participation

BMP Categorization	Brief BMP Description (enter your own text to override the drop down menu)	Responsible Department/Parties (enter your own text to override the drop down menu)	Additional Description/ Measurable Goal	Beginning Year of BMP Imple-mentation
Public Review	Provide for Public Review of SWMP and Annual Reports.	MassDevelopment (Engineering)/Devens Enterprise Commission	Make SWMP and annual reports available to public at MassDevelopment Offices & on Devens website.	2018
Public Participation	Provide Public Opportunity to Participate in SWMP Development.	MassDevelopment (Engineering)/Devens Enterprise Commission	Allow public to comment on stormwater management plan annually.	2018
Public Participation	Continue to provide public access to Recycling Drop-Off.	MassDevelopment (DPW)	Continue to provide public access to the recycling drop off at the DPW Facility.	2018
Public Participation	Continue public access to Regional Household Haz. Waste Collection C	MassDevelopment	Continue participation in Devens Regional Household Hazardous Products Collection Center.	2018
Public Participation	Continue participation in the Nashua River Watershed Association .	Devens Enterprise Commission/MassDevelopment	Attend or participate in at least one meeting or event annually of the Nashua River Watershed Association.	2018
Public Participation	Provide community access to clean up days, tree plantings, etc.	Devens Enterprise Commission/MassDevelopment	Sponsor one activity annually for public involvement.	2018
Public Participation	Continue participation in the Devens Eco-Efficiency Center.	Devens Enterprise Commission	Provide at least one program/service annually to assist local businesses in reducing the amount of waste they generate and disposal costs.	2018

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)

BMP Categorization (enter your own text to override the drop down menu)	**BMP Description**	**Responsible Department/Parties** (enter your own text to override the drop down menu)	**Measurable Goal** (all text can be overwritten)	**Beginning Year of BMP Imple-mentation**
Illicit Discharge Detection & Elimination Regulations	Review existing regulatory prohibitions and update as needed to provide required legal authority to prohibit, investigate, and eliminate illicit discharges. The general provisions of 974 CMR 4.08(2) currently require all projects to comply with MA DEP Stormwater Management Standards and submit a completed and endorsed stormwater management form which includes a signed Illicit Discharge Compliance Statement verifying that no illicit discharges exist on the site. Failure to prevent illicit discharges constitutes a violation of the Unified Permits issued for development at Devens and is subject to enforcement procedures outlined in 974 CMR 1.14.	MassDevelopment (Engineering & Utilities)	Review existing authority and prohibitions. Amend existing Devens regulations for enforcement as needed. Complete within 3 years of permit effective date.	2018

Sanitary Sewer Overflow (SSO) Inventory	Continue to maintain inventory of where SSOs have discharged over the last five years.	MassDevelopment (Utilities)/Devens Enterprise Commission (BOH)	Continue to maintain and update existing SSO Inventory annually and provide updates in annual MS4 reports.	2018
Storm Sewer System Map	Review and update existing drainage map to include catchment delineations, interconnections, and impaired waters. Update annually thereafter to incorporate drainage improvements, including drainage from new developments and re-developments.	MassDevelopment (Engineering)	Incorporate additional permit requirements and continue to review and update existing drainage GIS map annually.	2018
Written IDDE Program	Create written IDDE program to meet permit conditions.	MassDevelopment (Engineering/DPW/Operations)	Complete within 4 years of the effective date of permit and update as required.	2020
Outfall and Interconnection Inventory	All outfalls and interconnections have been mapped. Update outfall and interconnection inventory as needed to incorporate condition information.	MassDevelopment (Engineering/DPW Operations)	Review existing GIS and update inventory as needed. Complete within 4 years of permit effective date	2021
Priority Ranking	Assess and rank potential for catchments to have illicit discharges.	MassDevelopment (Engineering/DPW Operations)	Complete within 4 years of permit effective date.	2018
Dry Weather Screening	Conduct in accordance with outfall screening procedure and permit conditions	MassDevelopment (Engineering/DPW Operations)	Complete in conjunction with outfall & interconnection inventory and within 6 years of permit effective date.	2021
Follow-Up Ranking	Update ranking as dry weather screening information becomes available	MassDevelopment (Engineering/DPW Operations)	Complete within 6 years of permit effective date.	2021

Wet Weather Screening	Conduct in accordance with outfall screening procedure	MassDevelopment (Engineering/DPW Operations)	Complete after dry weather screening is complete and before catchment investigations are complete within13 years of permit effective date.	2022
Employee Training	Train employees on IDDE implementation	MassDevelopment (Engineering/DPW Operations)	Train annually.	2021
Implement IDDE Program	Implement catchment investigations according to program and permit conditions	MassDevelopment (Engineering//DPW Operations)	Begin within 5 years of permit effective date and complete within 13 years of permit effective date.	2022
Ongoing Screening	Conduct dry weather and wet weather screening (as necessary).	MassDevelopment (Engineering/DPW Operations)	Complete ongoing outfall screening upon completion of IDDE program in Year 13.	2031

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

BMP Categorization (enter your own text to override the drop down menu or entered text)	**BMP Description**	**Responsible Department/Parties** (enter your own text to override the drop down menu)	**Measurable Goal** (all text can be overwritten)	**Beginning Year of BMP Imple-mentation**
Construction Site Stormwater Runoff Control Regulations	Continue compliance with Devens Enterprise Commission (DEC) regulatory requirements for Erosion & Sediment Control (ESC) Plan under 974 CMR 3.02(3)(e).	Devens Enterprise Commission/MassDevelopment	Continue compliance with existing regulations.	2018
Site Inspection and Enforcement of Erosion and Sediment	Continue implementation of 974 CMR 3.02(3)(e) and conditions of all site development approvals that require ESC plan and DEC inspection of all controls prior to commencement of construction. Standards conditions of approval also require Applicant maintain an ESC log for all controls that is to be made available for inspection by DEC. Document existing inspection procedures.	Devens Enterprise Commission/MassDevelopment	Continue existing site inspection and enforcement procedures. Document inspection and enforcement procedures. Procedures must be in written format within three years of permit effective date or by July 2021.	2020

Site plan review	Continued compliance with DEC regulatory requirements for ESC plan under 974 CMR 3.02 (3)(e) , protection of steep slopes 974 CMR 3.06, earth removal 974 CMR 4.07 and stormwater management 974 CMR 4.08. Document existing site plan review procedures.	Devens Enterprise Commission/Engineering	Continue existing site plan review procedures. Document existing site plan review procedures. Procedures must be in written format within three years of permit effective date or by July 2021.	2020
Erosion and Sediment Control	Continue compliance with DEC regulatory requirements for ESC Plan under 974 CMR 3.02 (3)(e) and 974 CMR 3.06.	Devens Enterprise Commission/MassDevelopment	Continue compliance with existing requirements for erosion and sediment control at construction sites. Ensure BMPs are appropriate for site conditions.	2018
Waste Control	Continue requiring waste disposal and recycling affidavits as part of building permit process: http://www.devensec.com/forms/Building_Permit_2016.pdf (see page 2). DEC Determination of Completeness requirements also require applicants to identify waste disposal methods as part of site plan (recycling, composting, reuse): http://www.devensec.com/forms/DOC_Form_2012.pdf (see page 3).	Devens Enterprise Commission/MassDevelopment	Continue to require compliance with existing requirements for waste control.	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

BMP Categorization (enter your own text to override the drop down menu or entered text)	**BMP Description**	**Responsible Department/Parties** (enter your own text to override the drop down menu)	**Measurable Goal** (all text can be overwritten)	**Beginning Year of BMP Imple-mentation**
Post Construction Stormwater Management Regulations	Continue to require compliance with Devens Enterprise Commission (DEC) regulatory requirements for post-construction runoff from new development and re-development as included in 974 CMR 4.08 and 4.09.	Devens Enterprise Commission/MassDevelopment (Engineering & Operations)	Continue compliance with existing regulations.	2018
Target Properties to Reduce Impervious Cover	Identify and priority rank at least 5 permittee-owned properties that could be modified or retrofitted with BMPs to reduce impervious cover and update annually.	MassDevelopment (Engineering/DPW Operations)	Complete within 6 years of permit effective date and report annually on retrofitted properties.	2023

Allow Green Infrastructure	Continue to require LID practices for all stormwater management projects where feasible: 974 CMR 3.04(4)(a)1. & 974 CMR 4.08. Continue to utilize and improve on green infrastructure guidelines to guide, regulate and incentivize green infrastructure on all development and redevelopment projects: http://www.devensec.com/development/Green_Infrastructure_Guidelines_Final_8-12-14.pdf . Continue to monitor impervious surface reductions in Devens Sustainable Indicators Reports.	Devens Enterprise Commission	Continue to require LID practices and, as well as monitor and track sustainable indicators including impervious surface reductions resulting from incorporation of LID.	2018
Street Design and Parking Lot Guidelines	Continue to require LID practices for all stormwater management projects where feasible: 974 CMR 3.04(4)(a)1. & 974 CMR 4.08. Continue to monitor impervious surface reductions in Devens Sustainable Indicators Reports.	Devens Enterprise Commission/MassDevelopment (Engineering)	Continue to require LID practices and, as well as monitor and track sustainable indicators including impervious surface reductions resulting from incorporation of LID.	2018
Ensure any stormwater controls or management practices for new development and redevelopment meet the retention or treatment requirements of the permit and all applicable requirements of the Massachusetts Stormwater Handbook.	Review existing regulatory requirements and amend requirements as needed to meet permit conditions.	Devens Enterprise Commission	Complete within 4 years of permit effective date.	2021

As-built plans for SW Control/Long-term O&M of BMPs	Continue current procedures which require the development of O&M Plans as part of the permitting process and as a condition of occupancy. Continue to require property owners to file annual reports regarding system maintenance to the DEC. Continue to require the submission of as-builts prior to occupancy.	Devens Enterprise Commission/MassDevelopment (Engineering)	Continue current procedures as they relate to development of O&M Plans and submission of as-built plans.	2018
Inspection of Private Detention Basins	Continue to inspect private detention basins annually to ensure compliance with existing O&M requirements.	Devens Enterprise Commission/MassDevelopment (Engineering)	Continue to inspect annually to ensure compliance with existing O&M Plans. Report on the number of properties in compliance.	2018

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

BMP Categorization (enter your own text to override the drop down menu or entered text)	**BMP Description**	**Responsible Department/Parties** (enter your own text to override the drop down menu)	**Measurable Goal** (all text can be overwritten)	**Beginning Year of BMP Imple-mentation**
Inventory of all permittee-owned parks and open spaces, buildings and facilities, and vehicles and equipment	Develop inventory of permittee-owned facilities and equipment, and update annually.	MassDevelopment (Engineering/DPW Operations)	Complete within 4 years from permit effective date and update annually as needed.	2021
Written O&M procedures	Create written O&M procedures for parks and open spaces, buildings and facilities, and vehicles and equipment	MassDevelopment (Engineering/DPW Operations)	Complete within 4 years of permit effective date.	2021
Infrastructure O&M	Formalize written program for operation and maintenance of MS4 infrastructure	MassDevelopment (Engineering/DPW Operations)	Complete within 4 years of permit effective date.	2021
Catch Basin Cleaning Optimization	Continue current practice of inspecting all catch basins annually, and quantifying the amount of sediment removed from each basin. Continue to utilize information collected to optimize existing cleaning practices.	MassDevelopment (Engineering/DPW Operations)	Continue to track sediment removed and optimize catch basin cleaning operations. Complete optimization plan within 4 years of permit effective date.	2018
Catch basin cleaning	Continue to target areas where catch basins fill up with sediment more quickly to ensure that each catch basin is no more than 50% full. Modify cleaning schedule and frequency as needed.	MassDevelopment (Engineering/DPW Operations)	Clean catch basins on established schedule and report number of catch basins cleaned and volume of material removed annually.	2018

Street sweeping program	Continue to sweep all streets and permitee-owned parking lots at least annually in accordance with permit conditions.	MassDevelopment (Engineering/DPW Operations)	Sweep all streets and permitee-owned parking lots at least once per year in the spring and report annually.	2018
Road salt use optimization program	Continue to calibrate equipment annually. Continue to review and enhance existing practices to minimize the use of road salt.	MassDevelopment (Engineering/DPW Operations)	Continue current efforts and modify existing practices where feasible for further optimization of road salt use. Complete optimization plan within 4 years of permit effective date.	2021
Inspections and maintenance of stormwater treatment structures	Continue to inspect detention ponds annually and clean as needed. Establish and implement inspection and maintenance procedures and frequencies for other stormwater treatment structures.	Devens Enterprise Commission/MassDevelopment (Engineering/DPW (	Review existing procedures and optimize. Inspect and maintain treatment structures at least annually. Begin annual inspections within 4 years of permit effective date.	2021
Stormwater Pollution Prevention Plan (SWPPP)	Create SWPPPs for waste-handling facilities not already covered under the Multi-Sector General Permit.	MassDevelopment (Engineering/DPW Operations)/Devens Enterprise C	Develop SWPPPs within 4 years of permit effective date and complete inspections and training annually thereafter.	2021

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

Part III: Stormwater Management Program Summary (continued)

Actions for Meeting Total Maximum Daily Load (TMDL) Requirements

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

Applicable TMDL	**Action Description**	**Responsible Department/Parties** (enter your own text to override the drop down menu)

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

Part III: Stormwater Management Program Summary (continued)

Actions for Meeting Requirements Related to Water Quality Limited Waters

Use the drop-down menus to select the pollutant causing the water quality limitation and enter the waterbody ID(s) experiencing excursions above water quality standards for that pollutant. Choose the action description from the dropdown menu and indicate the responsible party. If no options are applicable, or more than one, **enter your own text to override drop-down menus.**

Pollutant	Waterbody ID(s)	Action Description	Responsible Department/Parties (enter your own text to override the drop down menu)
Phosphorus	Nashua River (Segment MA-81-05)	Adhere to requirements in part II of Appendix H	Mass Development/Devens Enterprise Commission
E. Coli	Nashua River (Segment MA-81-05); Catacoonamug Brook (Segment MA 81-74)	Adhere to requirements in part III of Appendix H	Mass Development/Devens Enterprise Commission
	** Specific requirements related to impaired waters are included as a supplement to this Notice of Intent.		

Part IV: Notes and additional information

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

Devens does not currently discharge to any water bodies or tributaries of any water bodies that have approved TMDLs.

Devens does discharge to water bodies that have phosphorus and E.coli impairments which require development of a TMDL. The Nashua River is impaired for both phosphorus and E.coli, and the Catacoonamug Brook is impaired for E.coli. Per Part III of this Notice of Intent, and per Part 2.2.2. and Appendix H of the 2016 MS4 General Permit, best management practices that will be implemented to meet requirements related to water quality impaired waters are summarized in the attached supplemental information.

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:	Lauren A. Liss	Title:	President and Chief Executive Officer
Signature:	Robert M. Ruzzo for Lauren A. Liss	Date:	03/22/18

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

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

Supplemental Information

Notice of Intent for Coverage under the Small MS4 General Permit – Supplemental Information

Devens, MA

2003 MS4 Permit Requirements

Based on the 2000 census, Devens was not considered an urbanized area and therefore was not regulated under the 2003 MS4 Permit. Although not required to apply for coverage under the 2003 MS4 Permit, Devens is already in compliance with many of the 2003 MS4 permit requirements. All outfalls and receiving waters in Devens have been mapped. A GIS drainage map of the storm drain system in Devens has been prepared and a copy is attached. In addition, both Construction and Post-Construction Stormwater Runoff Management Regulations were approved by the Devens Enterprise Commission on September 27, 2011 and became effective on December 9, 2011. With respect to the Illicit Discharge Detection and Elimination (IDDE) regulatory requirements, Devens plans to review existing authority and prohibitions, and amend the existing Devens regulations for enforcement as needed. It is anticipated that Devens will be in compliance with the IDDE regulatory requirements prior to 2021.

The schedule outlined for implementation of Best Management Practices included in the NOI demonstrates, for the most part, an accelerated schedule that exceeds the schedule outlined in the 2016 MS4 General Permit for new permittees.

ESA

Mass Development is certifying Endangered Species Act (ESA) eligibility for coverage under the permit according to USFWS Criterion C. Based on the online review performed, it has been determined that there are two threatened species within Devens. These include the Northern Long-eared Bat and the Small Whorled Pogonia. Please see attached correspondence from the United States Department of the Interior dated October 10, 2017 identifying the presence of these two species within Devens. It is our belief that existing stormwater discharges regulated under the permit will have no adverse impact on these federally threatened species. Prior to the installation of any structural BMPs, an endangered species screening will be conducted for the proposed site. The USFWS will be contacted if is determined that the new activity "may affect" or is "not likely to adversely affect" listed species or critical habitat under the jurisdiction of the USFWS.

Impaired Waters

Devens discharges to water bodies that have phosphorus and E.coli impairments which require development of a TMDL. The Nashua River is impaired for both phosphorus and E.coli, and the Catacoonamug Brook is impaired for E.coli. Per Part III of this Notice of Intent, and per Part 2.2.2. and Appendix H of the 2016 MS4 Permit, best management practices that will be implemented to meet requirements related to water quality impaired waters include:

- H.II.1.a.i.1 Distribution of educational message to residential and business/commercial/ institutional property owners annually in March/April on the proper use and disposal of grass clippings and the proper use of slow-release and phosphorous-free fertilizers. Begin within 3 years of permit effective date. Beginning year of implementation: 2020.

- H.II.1.a.i.1 Distribution of pet waste management message to residential property owners annually in June/July starting within 3 years of the permit effective date. Beginning year of implementation: 2020.

- H.II.1.a.i.1 Distribution of leaf litter disposal message to Residential/Business/Commercial property owners annually August-October starting within three years of the permit effective date. Beginning year of implementation: 2020.

- H.II.1.a.i.2 Modification of stormwater management regulations to require that new development and re-development stormwater BMPs are optimized for phosphorus removal within 4 years of permit effective date. Beginning year of implementation: 2021.

- H.II.1.a.i.2 Inventory and priority ranking of permittee-owned property and infrastructure that can be retrofitted with BMPs to include consideration of BMPs that infiltrate stormwater within 6 years of permit effective date. Beginning year of implementation: 2023.

- H.II.1.a.i.3 Development of a program to manage grass clippings and leaf litter on permittee owned property within 4 years of permit effective date. Beginning year of implementation: 2021.

- H.II.1.a.i.3 An increase in frequency of sweeping of public streets and municipal parking lots to a minimum of two times per year in drainage areas tributary to the Nashua River within 3 years of permit effective date. Beginning year of implementation: 2020.

- H.II.1.b Development of a Phosphorus Source Identification Report within 6 years of the permit effective date. Beginning year of implementation: 2023.

- H.II.1.c Evaluation of all permittee-owned properties identified as presenting retrofit opportunities or areas for structural BMP installation or identified in the Phosphorus Source Identification Report that are within the drainage area of the Nashua River or its tributaries within 7 years of permit effective date. Beginning year of implementation: 2024.

- H.II.1.c Planning/installation of one structural BMP demonstration project within 8 years of the permit effective date. Beginning year of implementation: 2025.

- H.II.1.c Installation of remaining BMP retrofits in accordance with the plan and schedule identified in the Phosphorus Source Identification Report.

- H.II.1.c Tracking and reporting of BMP installations and estimated phosphorus removal annually starting in Year 9. Beginning year of implementation: 2026.

- H.III.2.a.i Distribution of residential message on pet waste management annually within 3 years of permit effective date. Beginning year of implementation: 2020.

- H.III.2.a.i Dissemination of required public education information to dog owners at license renewal within 3 years of the permit effective date. Beginning year of implementation: 2020.

- H.III.2.a.i Distribution of public education materials to septic system owners within three years of permit effective date. Beginning year of implementation: 2020.

- H.III.2.a.ii Ranking of catchments tributary to bacteria/pathogen impaired waters as Problem or High in catchment ranking within three years of permit effective date. Beginning year of implementation: 2020.

Correspondence from the United States Department of the Interior
October 10, 2017

United States Department of the Interior

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

In Reply Refer To:
Consultation Code: 05E1NE00-2018-SLI-0109
Event Code: 05E1NE00-2018-E-00237
Project Name: Devens MS4 Compliance

October 10, 2017

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

To Whom It May Concern:

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

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

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

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the

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

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

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

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

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

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

Attachment(s):

- Official Species List

Project Summary

Consultation Code: 05E1NE00-2018-SLI-0109

Event Code: 05E1NE00-2018-E-00237

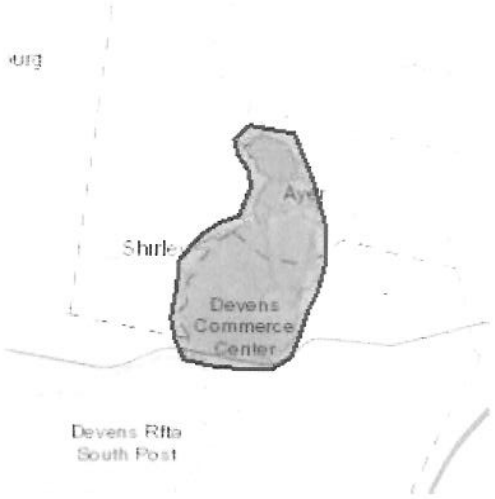
Project Name: Devens MS4 Compliance

Project Type: ** OTHER **

Project Description: The purpose is to perform an Endangered Species Act review to confirm that existing stormwater discharges will have no adverse impact on any identified endangered species.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/42.54807677161482N71.61098619641359W



Counties: Middlesex, MA | Worcester, MA

Endangered Species Act Species

There is a total of 2 threatened, endangered, or candidate species on this species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. 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.

Mammals

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

Flowering Plants

NAME	STATUS
Small Whorled Pogonia *Isotria medeoloides* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1890	Threatened

Critical habitats

There are no critical habitats within your project area under this office's jurisdiction.

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

Part I: General Conditions

General Information

Name of Municipality or Organization: Devens/Massachusetts Development Finance Agency

State: MA

EPA NPDES Permit Number (if applicable): N/A

Primary MS4 Program Manager Contact Information

Name: John P. Marc-Aurele

Title: Engineering Manager

Street Address Line 1: 33 Andrews Parkway

Street Address Line 2:

City: Devens

State: MA

Zip Code: 01434

Email: JMarc-Aurele@Massdevelopment.com

Phone Number: (978) 784-2926

Fax Number: (978) 772-7496

Other Information

Stormwater Management Program (SWMP) Location (web address or physical location, if already completed): To Be Completed During Permit Year 1 and Posted to Devens Community Website (2018-2019).

Eligibility Determination

Endangered Species Act (ESA) Determination Complete? Yes

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

National Historic Preservation Act (NHPA) Determination Complete? Yes

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

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

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

Part III: Stormwater Management Program Summary (continued)

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

BMP Categorization (enter your own text to override the drop down menu or entered text)	**BMP Description**	**Responsible Department/Parties** (enter your own text to override the drop down menu)	**Measurable Goal** (all text can be overwritten)	**Beginning Year of BMP Imple-mentation**
Post Construction Stormwater Management Regulations	Continue to require compliance with Devens Enterprise Commission (DEC) regulatory requirements for post-construction runoff from new development and re-development as included in 974 CMR 4.08 and 4.09. and to comply with any federal permit requirements	Devens Enterprise Commission/MassDevelopment (Engineering & Operations)	Continue compliance with existing regulations.	2018
Target Properties to Reduce Impervious Cover	Identify and priority rank at least 5 permittee-owned properties that could be modified or retrofitted with BMPs to reduce impervious cover and update annually.	MassDevelopment (Engineering/DPW Operations)	Complete within 6 years of permit effective date and report annually on retrofitted properties.	2023

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

VIA EMAIL

March 6, 2019

Lauren A Liss
President and Chief Executive Officer

And;

John P. Marc-Aurele
Engineering Manager
33 Andrews Parkway
Devens, MA. 01434
JMarc-Aurele@Massdevelopment.com

Re: National Pollutant Discharge Elimination System Permit ID #: MAR042048,
Devens/Massachusetts Development Finance Agency

Dear John P. Marc-Aurele:

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

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

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

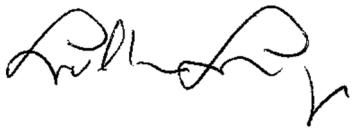
Information about the permit and available resources can be found on our website: https://www.epa.gov/npdes-permits/massachusetts-small-ms4-general-permit. Should you have

any questions regarding this permit please contact Newton Tedder at tedder.newton@epa.gov or (617) 918-1038.

Sincerely,

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

and;



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

APPENDIX E

MS4 Checklists By Permit Year

Checklist for Year 1 MS4 Permit Requirements – Devens

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
10/1/2018	Notice of Intent (NOI)	Prepare and Submit NOI for Permit Coverage 90 days from the permit effective date	1.7.2 & Appendix E	Yes
6/30/2019	Stormwater Management Plan (SWMP)	Develop written SWMP	1.10	Yes
6/30/2019	Public Education	Fulfill public education initiatives aimed at target audiences as outlined in the NOI and this SWMP	2.3.2	Yes
6/30/2019	Public Participation	Fulfill public participation initiatives aimed at target audiences as outlined in the NOI and this SWMP	2.3.3	Yes
6/30/2019	Street Sweeping	Sweep streets a minimum of once a year in the spring. Include miles cleaned or volume or mass of material removed in the annual report.	2.3.7.a.iii.3	Yes
6/30/2019	Catch Basin Cleaning	Clean catch basins annually to ensure the no catch basin is more than 50% full. Report catch basins cleaned and volume of material removed annually.	2.3.7.a.iii.3	Yes

Checklist for Year 2 MS4 Permit Requirements – Devens

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
6/30/2020	Stormwater Management Plan (SWMP)	Update written SWMP	1.10	
6/30/2020	Public Education	Fulfill public education initiatives aimed at target audiences as outlined in the NOI and this SWMP	2.3.2	
6/30/2020	Public Participation	Fulfill public participation initiatives aimed at target audiences as outlined in the NOI and this SWMP	2.3.3	
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	
6/30/2020	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	

Checklist for Year 3 MS4 Permit Requirements – Devens

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
6/30/2021	Stormwater Management Plan (SWMP)	Update written SWMP	1.10	
6/30/2021	Phosphorus Impaired Water Bodies	Implement public education initiatives; Sweep streets and municipal parking lots a minimum of two times per year in catchments tributary to phosphorus impaired water bodies	H.II.1.a.i.1; H.II.1.a.i.3	Yes
6/30/2021	Bacteria Impaired Water Bodies	Implement public education initiatives	H.III.2.a.i; H.III.2.a.ii	Yes
6/30/2021	Public Education	Fulfill public education initiatives aimed at target audiences as outlined in the NOI and this SWMP	2.3.2	
6/30/2021	Public Participation	Fulfill public participation initiatives aimed at target audiences as outlined in the NOI and this SWMP	2.3.3	
6/30/2021	Illicit Discharge Detection and Elimination (IDDE) Bylaw	Adopt regulatory mechanism providing legal authority to prohibit/investigate/eliminate illicit discharges.	2.3.4.a	
6/30/2021	Construction Site Stormwater Runoff Control Bylaw	Verify and document that existing regulations require sediment and erosion controls for disturbances of one acre or more	2.3.5.a	
6/30/2021	Construction Site Runoff Control Regulatory Updates/SOPs	Create written procedures for inspection of construction sites for proper sediment & erosion controls, and conducting site plan reviews. Incorporate requirements for waste control. Reference Stormwater Manual for Sediment & Erosion Control BMPs.	2.3.5.c	
6/30/2021	Post-Construction Stormwater Management Bylaw for New Development and Redevelopment	Verify and document that existing regulations require post-construction stormwater management for disturbances of one acre or more	2.3.6.a	
6/30/2021	Street Sweeping	Sweep streets a minimum of once per year in the spring. Include miles cleaned or	2.3.7.a.iii.3	

		volume or mass of material removed in the annual report.		
6/30/2021	Catch Basin Cleaning	Clean catch basins annually to ensure the no catch basin is more than 50% full. Report catch basins cleaned and volume of material removed annually.	2.3.7.a.iii.3	
6/30/2021	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	
6/30/2021	Stormwater BMP Inspection & Maintenance	Inspect all stormwater treatment structures (BMPs) at least annually and conduct maintenance as necessary. Track number of structures maintained and inspected annually.	2.3.7.a.iii.6	

Checklist for Year 4 MS4 Permit Requirements – Devens

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
6/30/2022	Stormwater Management Plan (SWMP)	Update written SWMP	1.10	
6/30/2022	Phosphorus Impaired Water Bodies	Implement public education initiatives; Modify stormwater regulations to require that new development and redevelopment BMPs are optimized for phosphorus removal; Development of a program to manage grass clippings and leaf litter on permittee-owned property; Sweep streets and municipal parking lots a minimum of two times per year in catchments tributary to phosphorus impaired water bodies	H.II.1.a.i.1; H.II.1.a.i.2; H.II.1.a.i.3	
6/30/2022	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	Yes
6/30/2022	Public Education	Fulfill public education initiatives aimed at target audiences as outlined in the NOI and this SWMP	2.3.2	
6/30/2022	Public Participation	Fulfill public participation initiatives aimed at target audiences as outlined in the NOI and this SWMP	2.3.3	
6/30/2022	Illicit Discharge Detection and Elimination (IDDE) Plan	Develop written IDDE plan to satisfy permit requirements.	2.3.4.6	
6/30/2022	Sanitary Sewer Overflow (SSO) Inventory	Document all SSOs that have occurred in the last 5 years	2.3.4.4.b	
6/30/2022	Catchment Delineation	Delineate outfall & interconnection catchment areas.	2.3.4.5	
6/30/2022	Catchment Prioritization & Ranking	Assess and rank the potential for all catchments to have illicit discharges.	2.3.4.7	
6/30/2022	IDDE Employee Training	Begin to train municipal employees on illicit discharge detection and monitoring.	2.3.4.11	

6/30/2022	Post-Construction Stormwater Runoff Control Regulatory Updates	Update existing stormwater regulations as needed to include compliance with the Stormwater Management Standards, to meet retention and treatment requirements, to meet as-built requirements and provide for long term operation & maintenance of BMPs.	2.3.6.a.ii	
6/30/2022	Inventory of Municipal Facilities	Develop an inventory of all permittee-owned facilities.	2.3.7.a.ii	
6/30/2022	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	
6/30/2022	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	
6/30/2022	Street Sweeping	Sweep streets a minimum of once a year in the spring. Include miles cleaned or volume or mass of material removed in the annual report.	2.3.7.a.iii.3	
6/30/2022	Catch Basin Cleaning	Clean catch basins annually to ensure the no catch basin is more than 50% full. Report catch basins cleaned and volume of material removed annually.	2.3.7.a.iii.3	
6/30/2022	Stormwater BMP Inspection & Maintenance	Inspect all stormwater treatment structures (BMPs) at least annually and conduct maintenance as necessary. Track number of structures maintained and inspected annually.	2.3.7.a.iii.6	
6/30/2022	Stormwater Pollution Prevention Plans (SWPPP)	Develop written SWPPPs for municipal waste handling facilities.	2.3.7.b	

Checklist for Year 5 MS4 Permit Requirements – Devens

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
6/30/2023	Stormwater Management Plan (SWMP)	Update written SWMP	1.10	
6/30/2023	Phosphorus Impaired Water Bodies	Implement public education initiatives; Sweep streets and municipal parking lots a minimum of two times per year in catchments tributary to phosphorus impaired water bodies	H.II.1.a.i.1; H.II.1.a.i.3; H.II.1.c	
6/30/2023	Bacteria Impaired Water Bodies	Implement public education initiatives	H.III.2.a.i	
6/30/2023	Public Education	Fulfill public education initiatives aimed at target audiences as outlined in the NOI and this SWMP	2.3.2	
6/30/2023	Public Participation	Fulfill public participation initiatives aimed at target audiences as outlined in the NOI and this SWMP	2.3.3	
6/30/2023	Update Drainage Map	Update MS4 mapping to include impaired waters, BMPs, interconnections, and open channel conveyances.	2.3.4.5	
6/30/2023	IDDE Employee Training	Continue to train municipal employees on illicit discharge detection and monitoring.	2.3.4.11	
6/30/2028	IDDE Investigation of Problem Catchments	Begin investigation of problem catchments	2.3.4.8.a	
6/30/2023	Street Sweeping	Sweep streets a minimum of once a year in the spring. Include miles cleaned or volume or mass of material removed in the annual report.	2.3.7.a.iii.3	
6/30/2023	Catch Basin Cleaning	Clean catch basins annually to ensure the no catch basin is more than 50% full. Report catch basins cleaned and volume of material removed annually.	2.3.7.a.iii.3	
6/30/2023	Stormwater BMP Inspection & Maintenance	Inspect all stormwater treatment structures (BMPs) at least annually and conduct maintenance as necessary. Track number of structures maintained and inspected annually.	2.3.7.a.iii.6	

Checklist for Year 6 MS4 Permit Requirements – Devens

Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
6/30/2024	Stormwater Management Plan (SWMP)	Update written SWMP	1.10	
6/30/2024	Phosphorus Impaired Water Bodies	Implement public education initiatives; Inventory and priority ranking of permittee-owned property and infrastructure that can be retrofitted with BMPs to include consideration of BMPs that infiltrate stormwater Sweep streets and municipal parking lots a minimum of two times per year in catchments tributary to phosphorus impaired water bodies; Develop Phosphorus Source Identification Report;	H.II.1.a.i.1; H.II.1.a.i.2; H.II.1.a.i.3; H.II.1.b	
6/30/2024	Bacteria Impaired Water Bodies	Implement public education initiatives	H.III.2.a.i	
6/30/2024	Public Education	Fulfill public education initiatives aimed at target audiences as outlined in the NOI and this SWMP	2.3.2	
6/30/2024	Public Participation	Fulfill public participation initiatives aimed at target audiences as outlined in the NOI and this SWMP	2.3.3	
6/30/2024	IDDE Employee Training	Continue to train municipal employees on illicit discharge detection and monitoring.	2.3.4.11	
6/30/2024	Dry Weather Outfall Screening and Sampling	Sample all outfalls and interconnections (excluding problem outfalls and excluded outfalls) for dry weather flow and sample flow if present.	2.3.4.7.b	
6/30/2024	Update Catchment Ranking	Update catchment ranking and prioritization based on dry weather outfall sampling data.	2.3.4.7.b.iii.c.iii	
6/30/2024	IDDE Investigation of Problem Catchments	Continue investigation of problem catchments	2.3.4.8.a	
6/30/2028	Begin IDDE Investigation of	Begin investigation of high and low priority catchments	2.3.4.8.a	

	High and Low Priority Catchments			
6/30/2024	Street Design and Parking Lot Guidelines	Develop a report assessing requirements that affect the creation of impervious cover to determine if design standards for streets and parking lots can be modified to support low impact design options.	2.3.6.b	
6/30/2024	Green Infrastructure Practices	Develop a report assessing the barriers and incentives for Green Infrastructure/LID techniques.	2.3.6.c	
6/30/2024	BMP Retrofit Identification	Identify 5 permittee-owned properties that could be retrofitted with stormwater BMPs.	2.3.6.d	
6/30/2024	Street Sweeping	Sweep streets a minimum of once a year in the spring. Include miles cleaned or volume or mass of material removed in the annual report.	2.3.7.a.iii.3	
6/30/2024	Catch Basin Cleaning	Clean catch basins annually to ensure the no catch basin is more than 50% full. Report catch basins cleaned and volume of material removed annually.	2.3.7.a.iii.3	
6/30/2024	Stormwater BMP Inspection & Maintenance	Inspect all stormwater treatment structures (BMPs) at least annually and conduct maintenance as necessary. Track number of structures maintained and inspected annually.	2.3.7.a.iii.6	

Checklist for Year 7 MS4 Permit Requirements – Devens

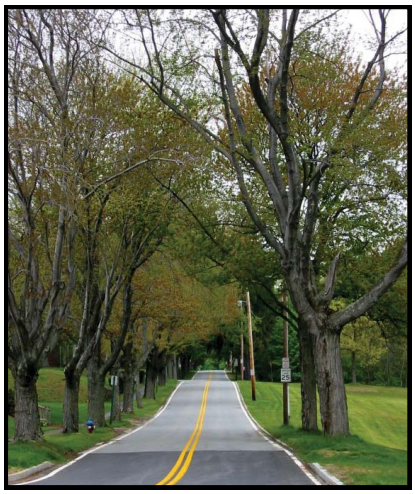
Completion Due Date	Requirement	Task	Permit Section for Reference	Completed?
6/30/2025	Stormwater Management Plan (SWMP)	Update written SWMP	1.10	
6/30/2025	Phosphorus Impaired Water Bodies	Implement public education initiatives; Sweep streets and municipal parking lots a minimum of two times per year in catchments tributary to phosphorus impaired water bodies; Evaluate all permittee-owned properties identified as presenting retrofit opportunities or areas for structural BMP installation or identified in the Phosphorus Source Identification Report & Develop implementation plan and schedule	H.II.1.a.i.1; H.II.1.a.i.3; H.II.1.c	
6/30/2025	Bacteria Impaired Water Bodies	Implement public education initiatives	H.III.2.a.i	
6/30/2025	Public Education	Fulfill public education initiatives aimed at target audiences as outlined in the NOI and this SWMP	2.3.2	
6/30/2025	Public Participation	Fulfill public participation initiatives aimed at target audiences as outlined in the NOI and this SWMP	2.3.3	
6/30/2025	Update Drainage Map	Update town-wide drainage mapping as needed to include MS4 infrastructure.	2.3.4.5	
6/30/2025	IDDE Investigation of Problem Catchments	Continue investigation of problem catchments	2.3.4.8.a	
6/30/2031	IDDE Investigation of High and Low Priority Catchments	Continue investigation of high and low priority catchments	2.3.4.8.a	
6/30/2025	IDDE Employee Training	Continue to train municipal employees on illicit discharge detection and monitoring.	2.3.4.11	
6/30/2025	Street Sweeping	Sweep streets a minimum of once a year in the spring.	2.3.7.a.iii.3	

		Include miles cleaned or volume or mass of material removed in the annual report.		
6/30/2025	Catch Basin Cleaning	Clean catch basins annually to ensure the no catch basin is more than 50% full. Report catch basins cleaned and volume of material removed annually.	2.3.7.a.iii.3	
6/30/2025	Stormwater BMP Inspection & Maintenance	Inspect all stormwater treatment structures (BMPs) at least annually and conduct maintenance as necessary. Track number of structures maintained and inspected annually.	2.3.7.a.iii.6	

APPENDIX F

Public Education Materials

Triple Bottom-Line Benefits of Street Trees in Devens



1. ECONOMIC:

Increased property value: realtor estimates of tree-lined streets vs. comparable non tree-lined streets have shown anywhere between 5-18% increase in home/business value. People prefer tree-lined streets!

Reduced Energy Costs: streets and parking lots can increase local temperatures which can significantly impact energy costs to homeowners and consumers. The shade provided from street trees, can reduce energy bills for a household by as much as 10%.

Return on Investment: for a planting cost of $250-600, a single street tree returns over $90,000 of direct benefits (not including aesthetic, social and environmental) in the lifetime of the tree.

Extended pavement life: the shade of street trees reduces daily heating and cooling (expansion/ contraction) of asphalt (gray infrastructure) and can extend the life of pavement up to 60% longer. This translates into a significant cost reduction for maintaining street systems.

Energy: Biomass from trees is a potential source of renewable energy for Municipalities.

2. ENVIRONMENTAL:

Grey Infrastructure to Green Infrastructure: The leaves, branches and trunks of street trees (green infrastructure) can capture up to 30% of a typical rainfall event through absorption and evaporation. Tree root systems can absorb up to another 30%, resulting in reduced stormwater runoff and potential flooding. This also results in less man-made drainage infrastructure (catch basins, piping, detention ponds).

Climate Change Mitigation: leaves absorb harmful pollutants like carbon dioxide (CO_2), carbon monoxide (CO), volatile organic compounds (VOC), nitrogen oxides (NOx), and particulate matter (PM) such as dirt, dust and soot. Street trees absorb nine times more pollutants than more distant trees, converting those harmful gasses back into oxygen and other useful and natural gasses.

Air Quality: shading provided by trees can reduce local temperatures by up to 15°F, which helps reduce the creation of ground-level ozone – a major contributor to smog & respiratory problems in kids &adults.

Habitat: street trees provide a canopy, root structure and setting for important insect &bacterial life below the surface. Above the surface, they provide biomass, nutrients and habitat for birds &other wildlife.

3. SOCIAL:

Public Safety: street trees help reduce solar glare and define the roadside edge and their canopy cover provides shading and separation from the road that can help protect pedestrians, guide motorists movements and help them better assess their speed. These attributes lead many motorists to exercise greater caution, resulting in reduced speeds (by as much as 15mph) as well as fewer accidents on streets lined with trees.

Public Health: trees reduce UV exposure for pedestrians and have a natural calming effect which can help reduce "road rage", local crime and vandalism, further improving the safety of streets and neighborhoods. Visual access to trees has also been shown to have a rehabilitating impact on our recovery from illness.

Noise Reduction: slower vehicle speeds as a result of street trees can reduce engine and tire noise. Their leafy vegetation can also absorb a great deal of noise in neighborhoods.

Aesthetics: trees provide a general softening of the urban environment and also provide a screen for utility poles, light poles, on-street and off-street parking and other features that create visual pollution. The aesthetics of tree lined streets and green spaces have been shown to have positive psychological benefits including lower rates of stress, blood pressure and mental illness.

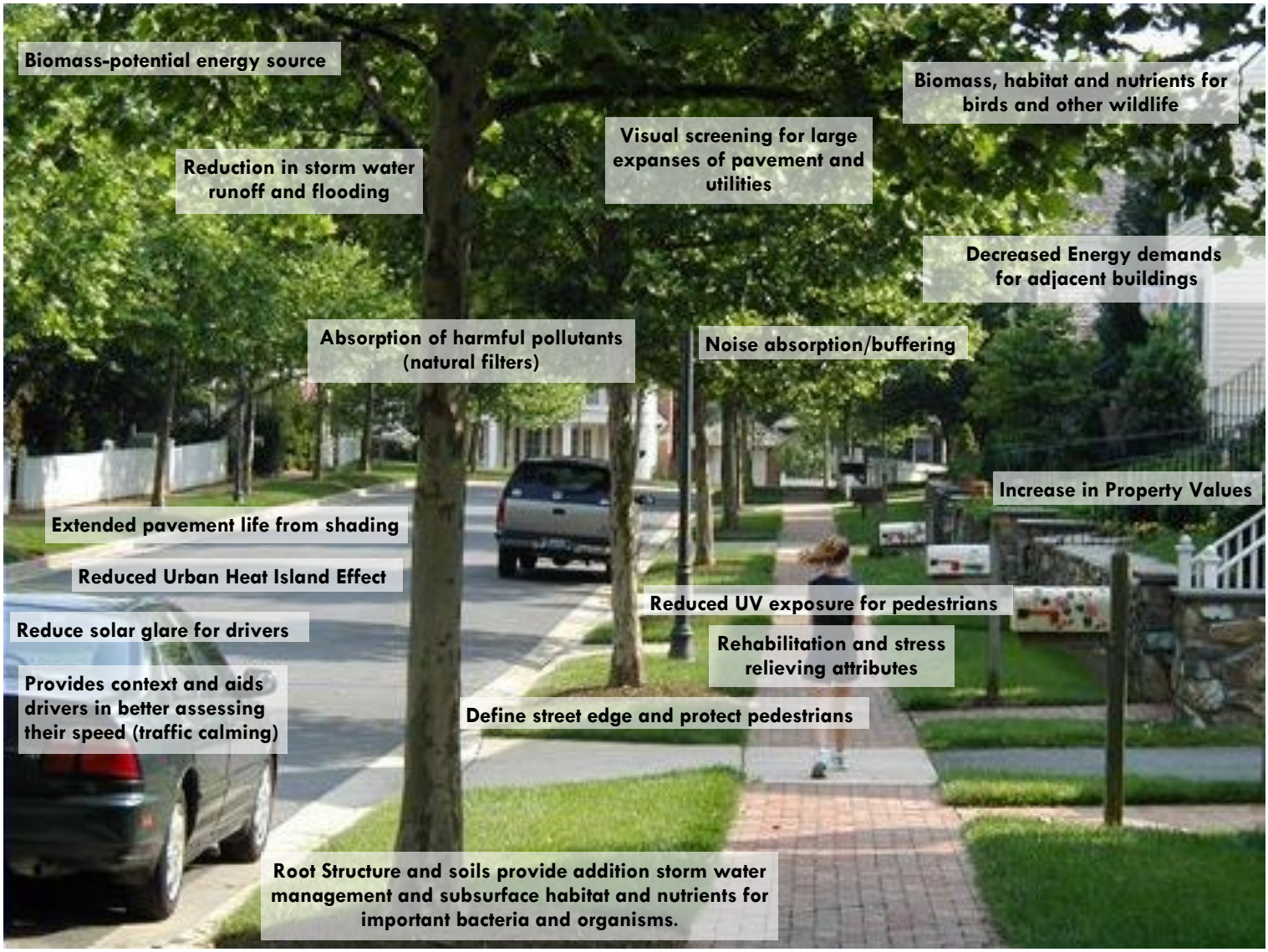
Tree Removal/Replacement in Devens:

For all of the above reasons, the Devens Enterprise Commission (DEC) regulates tree removal. Residents/ business owners should contact the DEC **prior** to removing trees from their property. For a list of noninvasive street tree species recommendations, visit www.devensec.com/rules-regs/decregs307.html

MassDevelopment, in conjunction with the DEC, has also conducted a street tree inventory in an effort to better care for and manage street trees within Devens. Annual assessments, trimming and replacement will help ensure street trees continue to thrive within Devens and benefit everyone's triple bottom-line!

Facts and Figures from the USDA Forest Service http://www.fs.fed.us/ucf/ **For more information, contact the DEC Enterprise Commission at 978.772.8831**

Triple Bottom-Line Benefits of Street Trees in Devens



Facts and Figures:

- "There are about 60– to 200-million spaces along our city streets where trees could be planted. This translates to the potential to absorb 33 million more tons of CO^2 every year, and saving $4 billion in energy costs." —*National Wildlife Federation*
- "The net cooling effect of a young, healthy tree is equivalent to ten room-size air conditioners operating 20 hours a day. Trees properly placed around buildings can reduce air conditioning needs by 30 percent and can save 20–50 percent in energy used for heating." —*USDA Forest Service*
- "Healthy, mature trees add an average of 10 percent to a property's value." —*USDA Forest Service*
- "One acre of forest absorbs six tons of carbon dioxide and puts out four tons of oxygen. This is enough to meet the annual needs of 18 people." —*U.S. Department of Agriculture*
- "Trees can be a stimulus to economic development, attracting new business and tourism. Commercial retail areas are more attractive to shoppers, apartments rent more quickly, tenants stay longer, and space in a wooded setting is more valuable to sell or rent." —*The Arbor Day Foundation*
- "In laboratory research, visual exposure to settings with trees has produced significant recovery from stress within five minutes, as indicated by changes in blood pressure and muscle tension." —*Dr. Roger S. Ulrich Texas A&M University*

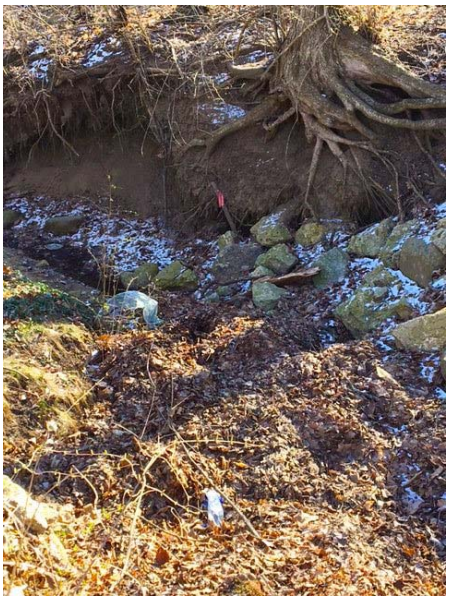
www.devensec.com

DEVENS
ENTERPRISE • COMMISSION

Dear Property Owner or Current Resident:

It is important to remember that yard waste, such as leaves, grass clippings, brush and tree branches should not be disposed of in or adjacent to stream beds or wetlands. Even debris left on stream banks can be washed into the stream bed during heavy rains, blocking channels and pipes and leading to flooding. Leaves and yard waste thrown in catch basins and dumped along roadsides can block culverts and pipes causing severe flooding and damage to streets.

In addition to flooding problems, dumping yard waste into or adjacent to streams and wetlands also contributes to water quality degradation. As it decomposes, yard waste can release excessive amounts of nutrients that can seep into and deprive streams of oxygen needed for aquatic life. Fertilizers in grass clippings can cause algal blooms in streams and ponds. Yard waste dumped along stream embankments can also provide refuge for rodents and stifle plant growth whose roots protect the stream bank from erosion.



If you are planning any vegetation removal, digging or construction activity within 100 feet of a pond, stream, or possible wetland area you should contact the Devens Enterprise Commission at (978) 772-8831 to determine if the activity is regulated.

If you observe dumping of yard waste or any other materials in storm drains, in wetlands or along streams, please call the Devens Department of Public Works at (978) 772-1864 or the Devens Enterprise Commission at (978) 772-8831.

We appreciate your cooperation in helping to keep the Devens environment clean and healthy.

Devens Engineering Department

Devens Department of Public Works

Devens Enterprise Commission

Devens Yard Waste Disposal and Composting

CURBSIDE PICK-UP

- Beginning the first Monday in April through November 30, the DPW will pick up yard waste in residential areas every Monday morning. In the event a holiday lands on a Monday curbside pickup will be the following Tuesday.
- Yard waste includes grass clippings, leaves, and tree limbs.
- Yard waste must be placed at the curb in the front of the house with no trash or sand mixed in.
- Leaves and grass clippings must be packaged in biodegradable paper bags.
- Branches and limbs should be cut into lengths of not more than 4 feet and bundled together.

Christmas trees will be picked up the first two Mondays in January.

COMPOSTING AT HOME

It's easy to compost yard waste and food scraps on your own and the Devens Department of Public Works makes it easier by offering rodent-resistant low-cost home composting bins. DPW has a limited supply available at 99 Buena Vista St. in Devens on a first come first serve basis.

To purchase one, please contact:

Melissa Ouellette
(978) 772-1864
mouellette@massdevelopment.com.

Additional information and details on how to compost can be found at:

https://tinyurl.com/devenscomposting

Recycling and Hazardous Waste Disposal Information

Devens Department of Public Works at 99 Buena Vista Street provides a recycling drop off area and also hosts The Devens Regional Household Hazardous Products Collection Center for residents and small commercial businesses in Devens and the surrounding region.

Complete details are available on-line at:

https://tinyurl.com/devensrecycling

or by calling Devens Public Works at (978)772-1864.

For more information on these and other topics to help protect and preserve the waters of the Commonwealth refer to https://www.thinkbluemassachusetts.org/for-residents

Low-Impact Development Techniques for Stormwater Management at Devens

Total Traditional Project Cost:	**$1,004,000**
LID Reduced site paving	-$32,000
LID Reduced curbing	-$50,000
LID Reduced stormwater piping	-$14,000
LID Reduced stormwater structures	-$68,000
LID Increased landscaping	+$12,000
LID Increased site preparation	+$10,000
LID Increased soil mix	+$18,000
Total Estimated LID Savings:	**-$124,000 (12%)**

Apex bio-filtration landscape islands (Phase 1)

Apex bio-filtration landscape islands (Phase 2)

Low-Impact Development Techniques for Stormwater Management at Devens

Greening Infrastructure Upgrades
-Vegetated roadside swales
-Micro-basins (local recharge)
-Native wildflower and grasses (low maintenance, increased infiltration)

Low-Impact Development Techniques for Stormwater Management at Devens

Evergreen Solar bio-filtration landscape islands

Natural open drainage vs. piping and catch basins

Devens Common underground infiltration systems

Devens Common cisterns collecting roof runoff

APPENDIX G

Regulatory Mechanisms

DEVENS ENTERPRISE COMMISSION

DEVELOPMENT

RULES AND REGULATIONS

Unofficial Copy

August 1996
Revised February 1998
Revised February 2003
Revised February 2010
Revised December 2011
Revised June 2012
Revised November 2013

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1.01: Preamble

(1) The Devens Enterprise Commission (the DEC) is vested with broad regulatory authority related to land use planning and permitting functions. Such permitting functions, described in St. 1993, c. 498, § 11 (the Act), and in greater detail in the Devens Zoning By-Laws (the By-Laws), are those normally assumed in cities and towns by Planning Boards, Boards of Health, Conservation Commissions, Boards of Appeal, and Historic District Commissions.

Functions include the following: (references are to applicable sections of the By-Laws unless otherwise specified):

(a) Adoption of regulations consistent with the By-Laws and the Act.

(b) Enforcement of By-Laws and Regulations (Article II, Section C)

(c) Special (Short Duration) Events (in part) and Earth Removal Permits (Article IV, Sections B and K)

(d) Delegation of certain powers to the Director to assist in the administration and enforcement of the By-Laws (Article II, Section E.2)

(e) Approval of Innovative Development Regulations and Unified Permits (Article III, Sections D, E, and F)

(f) Site Plan Review (Article III, Section H)

(g) Variances, Reconsiderations and Appeals (Article IV, Sections A, C through F)

(h) Expansion and/or Alteration of Nonconforming Buildings, Uses and Structures (Article VII)

(i) Subdivision Review (Article VIII)
(j) Historic District Reviews (Article X, Section D)
(k) Water Resource Protection (Article XI, Sections B through E)
(l) Wetlands Protection (Article XII)
(m) Sign Regulation (Article XIII)

(2) Relationship of Reuse Plan and By-Laws. The Devens Reuse Plan and By-Laws establish objectives, policies and standards to guide public and private decision-making and investment, ensure the maintenance of quality of life, and protect natural resources.

The By-Laws and any amendments shall be consistent with the Reuse Plan. Consistency shall mean that the By-Laws shall affirmatively carry out the goals, objectives, policies, and purposes of the Reuse Plan.

(3) Precedence. Unless specified otherwise, in case of conflict between the 974 CMR (Regulations), the Act, or the By-Laws, the order of precedence shall be:

(a) The Act,
(b) The Devens Reuse Plan,
(c) The By-Laws, then
(d) The Regulations.

(4) Other Key Reference Documents.

(a) Stormwater Pollution Prevention Plan dated July 1995
(b) Water Resources Protection Plan dated November 1994
(c) Devens Open Space and Recreation Plan dated September 12, 1996
(d) Devens Spill Prevention Control and Countermeasure Plan dated February 27, 2001
(e) Devens Main Post Trails report dated July 2001

1.02: Unified Development Permit System: Purpose, Overview, and General Requirements

(1) Unified Development Permit System. The process for reviewing Submissions in Devens is called Unified Permitting.

The purpose of Unified Permitting is to provide for expeditious permitting of land development to promote the orderly conversion and redevelopment of Devens. The DEC administers this system.

The major components of this system are zoning, site plan review and lotting or subdivision of land. Also included are variances, building permits, historic district certificates, board of health permits, wetlands approvals and water resources protection review, sign permits, and various licenses.

(2) Levels of Development Review. Submissions shall be processed pursuant to Level One or Level Two reviews.

Level One reviews are conducted by the Director and typically include minor modifications to building and site plans, building permits (without site development), and Certificates of Compliance under a Wetlands Order of Conditions, as well as Level One Lotting plans.

A Submission that is not deemed Level One will be subject to Level Two review. Level Two reviews are conducted by the DEC.

A Unified Permit (Permit), may be approved, approved with conditions, or disapproved by the DEC.

(3) Principal Components of the Unified Development Permit System. Among the most important components are site plan review and division of land.

(a) Site Plan Review involves the siting of buildings on lots and the creation of facilities and services designed to accommodate the needs of the site, including, but not limited to, vehicular parking and loading facilities, stormwater management, provision of utilities on-site, landscaping and screening, and other improvements.

(b) Division of Land may be accomplished by submission of a Subdivision or a Level One Lotting Plan. In a Level One Lotting Plan, two or more lots are created, provided that frontage and lot area comply with the By-Law requirements and the frontage is located along a way the DEC determines is maintained by MassDevelopment and used as a public way.

(4) Application and Submission Procedures for All Applications.

(a) Submission: Applications for Permits shall be submitted at the DEC's offices.

Devens Enterprise Commission
33 Andrews Parkway
Devens, Massachusetts 01434

Consent of the property owner is required for all Submissions. If land has not yet passed title from Mass Development to the new user seeking to locate a facility at Devens, the Submission shall be filed by Mass Development alone or in conjunction with the new user.

(b) Time Periods. Time periods are expressed in calendar days. If the last day of a time period falls on a federal or state holiday or on a weekend, the time period ends the next weekday. When calculating public hearing dates, the date of the hearing is in addition to the required time periods.

(c) Statement of Consistency with Reuse Plan and By-laws. Certain Submissions require the Applicant to submit a Statement of Consistency with the Reuse Plan and By-Laws. The Statement of Consistency includes:

1. A description of the proposed development, including type of business, type of operation, process or activities and other

information needed to clarify what will happen on the site once developed.

2. A statement detailing how the project complies with the following sections of the Reuse Plan:

a. Goals: including a discussion of how the proposed development is "sustainable" (how it meets the needs of future generations) and how it materially contributes to a sustainable economy. How does the proposed development contribute to the diversity of uses at Devens? How does it provide employment opportunities for persons with a range of skills and experience levels?

b. Objectives: including a discussion of how the proposed development will create jobs and benefit the regional workforce, those features of the proposal which build on Devens' unique characteristics, how the proposed development will protect and enhance quality of life, how the Applicant proposes to participate in some or all of the DEC's sustainability programs, and how the proposal protects and enhances Devens' ecological resources. Discussion should include specific measures to mitigate its impacts on the environment and surrounding communities.

c. A statement of how the proposed use and development comply with Zoning district goals and objectives of the By-Laws and the Patterns (section 4 of the Reuse Plan) for the zoning district in which the site is located.

d. Any other relevant portions of the Reuse Plan.

e. A narrative demonstrating compliance with other applicable sections of the By-Laws.

(d) Industrial Performance Standards. During the Pre-Permitting Conferences, the Director shall determine whether the Applicant shall provide data pertaining to some or all of the Industrial Performance Standards (974 CMR 4.01 through 4.05) along with the type and extent of the data to be required. The burden of proof shall be on the Applicant to demonstrate compliance with the Industrial Performance Standards.

(e) Waivers of Requirements and Design Standards. If the Applicant requests a Waiver (elimination or modification) of a Submission or Plan Form and Contents requirement or a Design Standard, the request shall be made in writing specifying the provisions to be waived, as part of the Submission.

1. Requirements Waivers. The Director shall determine whether to grant waivers from Submission and Plan Form and Contents requirements. Requests for these Waivers shall be made and the Director's responses shall be provided prior to the deadline for the DOC. In determining whether to grant a Waiver, the Director shall consider whether the Waiver:

a. Has minimal or no applicability to the Submission; or

b. Does not impair the ability of the Director and the DEC to evaluate the nature and effects of the proposed project; or

c. Is already provided in an alternative form acceptable to the Director.

2. Design Waivers. The DEC shall determine whether to grant, grant with conditions, or deny Waivers from Design Standards. These requests shall be made prior to expiration of the appropriate time limits set forth in 974 CMR 1.08.

In determining whether to grant a Waiver, the DEC shall consider whether the Waiver:

a. Is consistent with the intent and purpose of the By-Laws and the applicable regulations; or

b. Does not impair the ability of the DEC to evaluate the nature and effects of the proposed project; or

c. Results in a standard that functions as effectively or better than the required Design Standards.

(f) Provision of Additional Information. The DEC may require the Applicant to provide reasonable additional technical data in response to concerns of the DEC or people who have submitted comments for the record. In doing so, the DEC shall establish reasonable time limits for the submission and review of the data, in order that the review process will not be unnecessarily delayed.

(g) Withdrawals of Permit Submissions. At any time prior to a decision of the DEC or Director, the Applicant may withdraw a Submission provided the request is made in writing to the DEC or Director. The withdrawal shall be acknowledged in writing, with a copy delivered to the Applicant.

1.03: Level One Review

(1) Level One review is an administrative approval process conducted by the Director. The following are subject to Level One Review:

(a) Issuance of a Building or Occupancy Permit wherein no other DEC action or site plan review is required.

(b) Alteration or creation of a lot for any of the following purposes: revision of lot lines, division of a lot containing two buildings into two lots with separate buildings and division of a single lot unimproved by a building into two or more smaller lots with frontage; provided in any event, all resultant lots comply with the frontage requirements in Article VIII of the By-Laws and frontage shall be on a way the DEC determines is maintained by Mass Development and used as a public way.

(c) Minor architectural modifications of a structure within a historic district consistent in scope with the following examples: movement of less than six inches in an approved window or door opening; modifications of less than two total inches on an approved shutter or removable facade feature; shifts of less than one foot of a staircase or

existing canopy; modifications to approved signs involving less than 10% of the sign area; or reasonable modifications to sign placement for practical reasons.

(d) Engineering adjustments to an already approved site plan consistent in scope with the following examples: a change to more desirable landscape material; a shift of less than eight feet in building placement on a lot; a shift in site utility connections, in order to provide improved hookup to the public system or to avoid a natural constraint; an adjustment of not more than three feet in the width or location of a driveway entrance, in order to improve sight distance or to avoid a natural constraint; similar adjustments required to facilitate a more functional site plan.

(e) Issuance of a Certificate of Compliance under a Wetlands Order of Conditions.

(2) Level One Review and Decision. The Director shall determine whether a Submission is subject to Level One review. Within 14 days of the receipt by the Director of a Level One Submission the Director shall determine whether it is complete. Within the time periods shown in 974 CMR 1.08 the Director shall approve, approve with conditions, or deny the Submission. No public hearing or meeting is required.

(3) Level One Lotting Plan

(a) Purpose and Process. An Applicant who seeks to create or alter a lot 974 CMR 1.03(1)(b) shall apply to the Director for a determination that the plan does not require Definitive Plan endorsement and does not require Level Two review. The review process will provide an appropriate and expeditious review of plans that relocate lot lines and create lots with frontage on a public way.

(b) Level One Lotting Plan Submission Requirements. A Level One Plan shall include the following:

1. A completed Permit application form.
2. The required fees.
3. A record copy of the plan in digital form. In the absence of digital capability, mylar reproducible sheets and hard copies will suffice.
4. Three (3) copies of the plan and a mylar plan acceptable to the Registry for recording.
5. A narrative explaining why the plan should be deemed a Level One Plan.
6. Information on traffic levels on abutting street(s), including ADT and peak hour (a.m. and p.m.) levels and estimated traffic generation for proposed lot based on build-out allowed under zoning.
7. At proposed curb cut locations, sight distances shall be provided in accordance with current AASHTO guidelines for

prevailing (85th percentile) speeds on adjacent ways to ensure adequate safety.

(c) Plan Form and Contents. The plan submitted for endorsement as a Level One Plan shall show the following:

1. Plan title, north arrow, date, and scale.
2. Locus.
3. Name and address of Owner, the Applicant (if different from the Owner), and the Engineer or Surveyor.
4. Seal and signature of the Engineer and/or Surveyor.
5. A list of any Institutional Controls imposed on the parcel.
6. Abutting properties labeled with the names of all abutting property owners as they appear in the most recent tax list.
7. Location of bounds with existing and proposed permanent bounds clearly differentiated.
8. Boundaries of the land being divided or the new or revised lots. All adjacent parcels held by the Owner or Applicant shall be shown in their entirety.
9. The name of the street and width of the right-of-way providing frontage and access to the lots shown on the plan and the extent of paved improvements within the right-of-way.
10. All existing lot lines, lot areas, and easements.
11. All proposed lot lines, total square footage of proposed lot(s), lot frontages, and easements. Proposed lots shall be numbered for identification.
12. Location of all existing structures, rights-of-way, easements, lots, and roadways.
13. Sufficient data to determine location, width, direction, and length of every street and way line, lot line, and boundary line.
14. Suitable signature space for endorsement of plan by the Director.
15. Zoning classification and location of any zoning district boundaries that lie within the locus of the plan.
16. Notation of any variance issued as to the land or structures within the parcel giving the Devens case number, date granted, and description of the varianc

(d) Review Criteria for a Level One Lotting Plan. The Director shall approve or approve with conditions a Level One Lotting Plan if all of the following criteria are met:

1. the lot lines are revised or a lot is divided;
2. all lots comply with the frontage and lot area requirements of the By-Laws;
3. the frontage for the proposed lot(s) is on a way that Mass Development maintains and is used as a public way; and
4. the alignment of the existing and any proposed way provides adequate sight distances from possible driveway location(s) and the travelway and paved width of the existing way

(and any proposed way) can reasonably accommodate anticipated peak traffic flows without producing level of service failures or safety problems at adjacent intersections; and whether vehicular access to the lot can be provided over the frontage of the lot or alternative permanent vehicular access has been determined adequate by the Director.

(4) Level One Development Plan

(a) Minor additions to existing buildings or parking lots that do not require Level Two Site Plan review shall require approval by the Director of a "Level One Development Plan". To obtain approval of a Level One Development Plan the Applicant shall submit six copies of a plan complying with the Plan Form and Contents requirements for a Level One Lotting Plan and the following:

1. Topography with contour lines at five feet intervals or less.
2. Surface water drainage for the entire parcel at a conceptual engineering level, indication of flow direction, interim and permanent surface catchments and channels (depicted at a general plan view level), the location and general type of manmade drainage structures, and similar information shall be reflected.

(b) In addition to the plans, the following shall be submitted:

1. A completed Permit application form.
2. The required fees.
3. A record copy of the plan shall be submitted for DEC records in an acceptable electronic format. In the absence of digital capability, mylar reproducible sheets and hard copies will suffice.
4. A narrative explaining why the plan should be deemed a Level One Plan.
5. A narrative demonstrating consistency with the Reuse Plan and By-Laws meeting the specifications of 974 CMR 1.02 (4)(c).
6. A list of Waivers (if any).
7. Any other information the Director deems necessary in order to determine compliance with Review Criteria in subsection (d)

(c) If a Level One Lotting Plan has been previously approved or is submitted simultaneously with a Level One Development Plan, information on the Lotting Plan need not be duplicated on the Level One Development Plan.

(d) Review Criteria for a Level One Development Plan . The Director shall approve, or approve with conditions a Level One Development Plan if all of the following criteria are met:

1. the lot on which the development is located has or will be recorded at the Registry of Deeds;
2. the proposed action does not require Level Two review;

3. an adequate stormwater management system services the lot;
4. access and site circulation enables prompt fire, police, and emergency response;
5. connections with utility, power and communication systems available in the abutting infrastructure have been made; and
6. any Institutional Controls applicable to the lot have been located and noted on the plan.

1.04 Level Two Review

(1) Scoping Session: A preliminary meeting between the Applicant and the Director is strongly recommended. The purpose of the meeting is to determine the appropriate level of Permit, the components of the Permit, the timing of the Submission and permitting process, and a general scope of the project submittal items.

(2) Determination of Zoning Compliance. An Applicant may seek Determination from the DEC that the proposed uses and activities are permitted within the zoning district in which the development site is located and the proposed uses comply with the development goals applicable to that zoning district. Such determination is made by the Commission at a public meeting following submission of a statement of how the proposed use and development comply with Zoning district goals and objectives of the By-Laws and the Patterns (section 4 of the Reuse Plan) for the zoning district in which the site is located.

(3) Pre-Permitting and Final Conferences. For any Submission that will be subjected to Level Two review, the Applicant shall participate in as many Pre-Permitting Conferences as necessary with the Director. The discussion topics shall include a determination of which development issues are critical, Submission and Plan Form and Contents requirements, Waivers of Design Standards and preliminary time schedules. Where similar information is required by any two or more sections of these DEC regulations, such as 974 CMR 2.00 and 5.00 (one example being a large new campus-type office park with public roads) or 974 CMR 3.00 and 7.00 (new construction requiring site plan approval in the historic district), the Director will recommend elimination of duplication whenever possible. The Pre-Permitting Conference shall be scheduled, at which time the Submission and any remaining issues shall be discussed by the Applicant and Director. Upon completion of the Final Pre-Permitting Conference, the Director shall render a written DOC within 14 calendar days of the final Pre-Permitting Conference (974 CMR 1.08).

(4) Determination of Completeness (DOC).

(a) "Complete" means that a Submission complies with the Plan Form and Contents and Submission requirements of all applicable DEC

Rules and Regulations and includes the Statement of Consistency [974 CMR 1.02(4)(c)].

(b) The Director may determine that a Submission is complete, conditionally (or partially) complete, or incomplete. If the Director determines the Submission is incomplete, the Applicant shall be notified in writing of the deficiencies in the Submission.

(c) The Director shall forward to the DEC Submissions requiring Level Two review after a DOC has been issued. For Submissions determined conditionally complete, a schedule for the submission of deficient or additional items shall be attached to the DOC. The Director may forward an incomplete or conditionally complete Submission if the Applicant agrees in writing to submit the missing information by a date acceptable to the Director.

(d) If the Director does not issue a DOC within the required time limit, the Submission shall be deemed Complete. The date of the DOC is the date the time periods for review (974 CMR 1.08.) are commenced.

(5) Town Comment Period. The DEC shall provide the Towns with copies of complete Level Two Submissions. The Towns shall have 30 days to render comments to the DEC on the Submission. The public hearing shall not be closed until the thirty-day town comment period is concluded.

(6) Public Hearing Requirement and Abutter Notices. A public hearing shall be held for Level Two reviews. The DEC shall provide notice of public hearings to the general public and to abutters in the manner set forth in the By-Laws. The Applicant shall submit a certified list of abutters prepared by the Mass Development Division of Engineering (Devens) including the names and addresses of all property owners within 300 feet of the boundaries of the development site for which a permit is sought. If these properties are located outside Devens, the names and addresses of the owners shall be as shown on the most recent tax records of the town.

(7) Public Hearing Continuances. The DEC may, with the consent of the Applicant, agree to one or more continuances of public hearings of up to 30 days each. Substantive changes made to a plan as a result of review comments and deficient items which the Applicant must provide as a condition of the DOC shall be sent by the Applicant to the Towns at least five days prior to the date of the public hearing. Failure to do so shall result in continuation of the public hearing.

(8) The Voting Process. The Applicant and the DEC may agree to an extension of the time periods set forth in 974 CMR 1.08 to provide sufficient time for the DEC to render its decision. Unless otherwise stated, all DEC votes are by a majority of a quorum (a quorum is seven DEC members). Seven

votes are required for a Variance and Reconsideration. Eight votes are required to adopt or amend Regulations.

(9) Record of Decision (ROD). The ROD shall be rendered within 10 days from the date of the DEC's vote. The ROD shall be sent by Certified Mail to the town clerks of Harvard, Ayer and Shirley, and the Applicant. Receipt of the ROD by the last town clerk to certify its receipt shall be the commencement of the appeal period under section 11 of the Act. The Applicant shall record the ROD with the Registry of Deeds for both Worcester and Middlesex Counties and provide proof thereof to the DEC prior to the issuance of a building permit.

(10) Endorsement. After the appeal period has expired, the Applicant shall submit plans for endorsement. The signatures of seven members of the DEC on the first sheet of the Development Plans and that of the Chairman or his designee on the remaining sheets shall constitute Plan Endorsement. Plans shall be recorded with the Registry of Deeds for both Worcester and Middlesex Counties and proof of recordation submitted to the DEC prior to the issuance of a building permit.

(11) Public Health. When the DEC must conduct a public hearing as a local Board of Health (defined as a Level Two action), the hearing must be convened within 30 days of the date that the Director renders a DOC. In instances of Facility Site Permitting, the procedures set forth in M.G.L. C.111, take precedence over DEC regulations.

1.05 Surveying and bounds

(1) Surveys

(a) All survey work performed as part of a lotting plan, site plan or subdivision plan shall, at a minimum, adhere to 250 CMR 6.00 (Procedural and Technical Standards for the practice of Land Surveying). Where applicable, the MassDevelopment Engineering Department may establish additional standards of practice, apply more stringent requirements and/or require additional submission requirements.

(b) All surveys shall relate to the North American Datum of 1983 (NAD 83) and the National Geodetic Vertical Datum of 1929 (NGVD 1929). All data shall be referenced to the Massachusetts State Plane Coordinate System (Mainland Zone). The standard unit of measure shall be the U.S. Survey Foot.

(c) All surveys for the establishment of property lines, right of way lines and permanent easements shall tie into at least two (2) points in the Devens Survey Control Network. For traverse/level adjustments the published values of these existing control points shall be held fixed.

(d) All information submitted in digital format shall adhere to the standards of the MassDevelopment Engineering office.

TABLE 3: TIME LIMITS FOR REVIEW

Level One Review	**Time Limit in Days**
Lotting Plan	14
Development Plan	21
Engineering Adjustment	14
Building or Occupancy Permit	30
Other reviews authorized in the By-Laws, Article III, Section D	21
Level Two Review	(inclusive of the date of the DEC's vote)
Site Plan Review	75
Subdivision Approval	75
Wetlands	63
Variances	90
Reconsiderations (measured from the date of the request)	45
Historic District Certificates of Appropriateness	45

1.09: Project Duration and Project Completion

(a) Permit Duration. Unified Permits shall remain in effect so long as the approved development activities are commenced within the time periods prescribed below. These time periods commence from the date that the DEC or the Director renders a written decision. These periods shall be tolled during litigation.

TABLE 4: TIME LIMITS FOR COMMENCING AND COMPLETING DEVELOPMENT ACTIVITIES

Permit type	**Commencement**	**Completion**
Building Permits (construction of a building or structure)	Within six months	Two years or as approved by the DEC approved by the DEC
Subdivision Road	Within six months	One year
Approved Site Plan	Within six months	Two years
Other Components	Six to twelve months depending on project	Expeditiously

(2) A permit is completed upon application for a Certificate of Occupancy, Wetlands Certificate of Compliance, submission of an as-built plan.

(3) Extensions to the above time limits may be granted by the Commission in the instance of Level Two permits or the Director for Level One permits, providing written request for the extension is received prior to the expiration of the time limit and the Applicant explains the need for an extension.

(4) Failure to complete within the proscribed time limits shall result in withholding of any outstanding permits and/or revocation of performance guarantees.

(5) Phased Construction. An Applicant may request that the DEC allow phasing. The Applicant shall specify the phases requested, detailing the work to be accomplished in each phase and the locations of the work. The Applicant shall also propose dates of commencement and completion for each phase. In its approval of a phased Permit, the DEC shall establish reasonable time periods to commence and complete the phases of the entire project.

1.10 Vesting

(1) Purpose: To promote more predictable and equitable vesting of rights for development and to establish specific guidelines for determining the vested rights of properties affected by new or changed regulations.

(2) Rights Vested in Applicable Regulations:

(a) A building, structure, sign, parking space, landscaping amenities, loading dock, or other site improvement which complies with the provisions of these Regulations at the time at which a building permit is issued but would not comply with any proposed amendments to these Regulations may be completed, continued or maintained provided the following three conditions have been met:

1. The commencement of construction must be pursuant to a validly issued building permit.
2. There must be actual physical commencement of some significant and visible construction; and
3. The commencement must be undertaken in good faith, to wit, with the intention to continue with the construction and carry it through to completion.

(b) A building, structure, sign, parking space, landscaping, loading dock, or other site improvement constructed in compliance with duly issued building permits may be continued despite changes in Regulations, however, the construction of a new building, construction or expansion of a parking lot, structure, or loading dock, construction of an ancillary building greater than 800 square feet of gross floor area, or the construction of a project that will result in changes to the existing

(c) The DEC shall not approve the Amendment unless the Review Criteria for the component are satisfied.

1.13: Performance Guarantees

(1) Applicability. The DEC shall require a performance guarantee for any or all of the following Unified Permits components:

(a) Plans For a New Subdivision Road. The creation of roadways to provide frontage and access for lots, involving construction or substantial grading of any of the following improvements: streets and rights-of-way and all improvements therein (signs, monuments, street trees and planting strips, sidewalks); construction of utility system segment(s); earth removal and site alteration; drainage systems; and other features associated with opening the area for development.

(b) Site Plans. Site preparation, including grading and earth removal; driveways and internal access roads; landscaping; lighting; site drainage improvements; and other features associated with the site plan.

(c) Wetlands. Construction of any alterations and/or required mitigation measures pursuant to a Wetlands Permit (Orders of Conditions).

(d) Historic. Major Architectural Alteration of Buildings (and/or designated settings) within Devens Historic Districts, and subject to Massachusetts Historical Commission approval.

(e) Innovative or residential development.

(2) General Requirements.

(a) Form of performance guarantees. The DEC may require a performance guarantee as a single, inclusive instrument involving all components of a Unified Permit or, at the Director's discretion, may accept more than one type of instrument.

The following irrevocable Performance Guarantee instruments may be used by Applicants:

1. A performance insurance bond
2. A properly pledged passbook or other surety document or instrument that has been secured by the applicant in a recognized, State chartered, savings or lending institution
3. Other negotiable surety acceptable to the DEC, inclusive of a properly pledged and executed lenders agreement or letter of credit

(b) Agreement. The DEC shall enter into a written agreement with the Applicant whenever a Performance Guarantee is required. This document shall describe all pertinent terms and conditions, including the physical improvements being secured, the amount of money involved, and the obligations and rights of the parties under the agreement.

(3) Guarantee Amount and Value.

(a) The Director shall determine the amount of the guarantee, considering the scale of the proposed project and the potential risk.

(b) The Applicant shall submit to the Director an estimate of the cost of construction related to implementing the Permits(s). The estimate shall be prepared by an engineer or other suitably qualified professional, and shall include general quantities of materials and costs associated with construction (all calculated by linear foot, cubic yard, square foot, and other appropriate itemizations of quantities).

(c) For a Unified Permit, the estimated construction costs should include the full range of improvements starting with the earliest earth removal (associated with improvements) from the subdivision of land, and proceeding to improvements associated with the construction of a building. For Partial Permits, the estimated construction costs should only include the improvements associated with the Permits being sought.

(d) For phased construction, the DEC may allow Performance Guarantees for individual phases with the amounts calculated for a specific phase, particularly in situations when the phases in and of themselves result in the complete construction of a portion of the entire project. The Director may also allow the Performance Guarantee instrument to be used for each phase successively on the completion of the preceding phase.

(4) Release.

(a) Based on a written request by an applicant that includes an estimation of the remaining site completion costs, and based on an inspection conducted by DEC staff, the Director shall determine whether a release of a performance guarantee is warranted.

(b) The Director shall, within 14 days of receipt of such request render a decision to either reduce, release, or maintain the value of the performance guarantee posted by an applicant. In the event the Director determines the original guarantee amount should continue to be held or elects to retain a greater amount than that requested to be released by the applicant, the Director shall list the reasons for its decision and the improvements that still need to be completed.

(c) Resolution of disputes related to a partial or full surety release shall be by means of the Reconsideration process described in 974 CMR 1.12. Partial release points are permissible at distinct construction milestones, at the discretion of the Director.

(5) Certificates of Occupancy and Performance Guarantees. A Certificate of Occupancy shall not be issued if any work items, whether in the building or site improvements associated with the Permit, remain incomplete. A temporary Certificate of Occupancy may be issued by the Building Official provided

sufficient surety has been posted with the Director for any outstanding site improvements.

(6) Conversion to Another Form of Performance Guarantee.

(a) The Director may allow the form of a performance guarantee to be revised or substituted with an alternative form of security. If the alternate performance guarantees are deemed by the Director to be equally as protective of the public interest as the preceding form of security, they will be granted. Where an Applicant proposes to change a performance guarantee instrument, a written request shall be given to the Director, that sets forth and includes:

(1) The extent and scope of remaining work to implement a Unified Permit to satisfy DEC requirements and/or conditions;

(2) An estimate, as provided above, that reflects all remaining construction; and

(3) The form and alternative type of guarantee being proposed to secure all remaining improvements.

(b) The Director shall make a determination on the sufficiency of the submitted estimate and the suitability of the alternate form of security. If the estimate and alternative form of security is deemed adequate, the new performance guarantee shall be appropriately pledged and secured. An amended or new agreement may be required. On acceptance by the Director of the new performance guarantee, the prior guarantee or security provided shall be released.

1.14: Enforcement

(1) Right to Inspect. The DEC, its staff, and consultants shall have the right to enter all properties at Devens at reasonable times, for the purpose of observing and investigating construction and/or operations on the site in regard to enforcement of the Regulations or the By-Laws.

(2) Enforcement Powers. The DEC's enforcement powers include:

(a) withholding of building and occupancy permits;

(b) power to assess penalties for violations of the Reuse Plan, By-Laws, or 974 CMR in amounts no more than $300 per day per violation, provided that each day such violation continues shall constitute a separate offense;

(c) power to institute actions in Court to compel the removal, alteration, or relocation of any structure that violates the Reuse Plan, By-Laws, or 974 CMR;

(d) zoning enforcement powers;

(e) enforcement powers available to a zoning board of appeals;

(f) power to require security for the construction of ways and municipal services to a subdivision that was approved by the DEC;

(g) powers available to enforce the subdivision control and lotting sections of the By-Laws and the Regulations;

(h) powers available to the DEC to enforce the Historic District Acts;
(i) powers provided to the DEC to make and enforce reasonable public health regulations including, but not limited to, the issuance of permits and the assessment of fines related to the violation of the By-Laws and 974 CMR including the removal and transport of garbage or other offensive substances, atmospheric pollution, disposal of cesspool and septic-tank waste, and the construction, maintenance, and alteration of certain sewage disposal systems; and
(j) other powers expressly and implicitly conferred on the DEC pursuant to St. 1993, c. 498.

(3) Complaint Process.
(a) Within 14 days of receipt of a written complaint, the Director or Building Official shall investigate, inspect the location, and determine if a violation exists. If no violation is found, the Director or Building Official shall make a written response to the complainant within 14 days explaining the finding.
(b) If a violation exists, the property owner and offending party shall be notified in writing of the violation and given a specified period of time to correct or eliminate the violation. The complainant shall receive a copy of the notice. At the end of the specified time, the Director or Building Official shall re-inspect and determine whether the violation has been corrected or eliminated. If not, the Director or Building Official shall notify the property owner and offending party in writing that the violation still exists and may commence the assessment of fines. After continued violation and with the consent of the DEC, Court action may be taken.
(c) If the public health or safety is endangered, the Director shall seek immediate correction and may, with the consent of the DEC, cause a complaint to be filed in Superior Court or in District Court in accord with MGL Chapter 40: Section 21D, Noncriminal Disposition. Alternatively, the DEC may correct the problem and file a complaint in Superior Court to recover the costs of repairs.

(4) Wetlands Enforcement Orders.
(a) Process. Enforcement Orders for work in the wetlands conducted without an Order of Conditions or done improperly after the issuance of an Order of Conditions may be issued by the DEC. The goal of enforcement is to secure prompt and continued compliance with 974 CMR 4.06 and the Order of Conditions. The DEC oversees work under Superseding and Final Orders issued by DEP and can issue enforcement orders under them.
(b) Ratification of Enforcement Orders. The policy of the DEC is to issue Enforcement Orders after a vote at a regularly-scheduled meeting of the DEC, unless the violation is of a very serious or emergency nature. If the Order is issued prior to a vote of the DEC, to remain in effect, said Order must be ratified by the DEC at its next meeting. The

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2.01: Process and Goals

(1) Subdivision is the component of the Unified Development Permit system that manages the construction and layout of ways. The Applicant shall follow the procedures for Level Two review set forth in 974 CMR 1.00.

(2) The goals of Subdivision are to ensure:
- (a) the safety, convenience, and welfare of the inhabitants of Devens and residents of the surrounding communities by regulating the laying out, construction and alteration of ways;
- (b) Development that facilitates safe and convenient vehicular, pedestrian and bicycle travel for people of all ages and abilities (universal design);
- (c) adequate vehicular and pedestrian Access to all Lots;
- (d) ways with adequate landscaping, lighting and sidewalks;
- (e) adequate wastewater, drainage, and emergency services, as well as adequate street lighting;
- (f) connections between and among proposed and existing ways, and residential, commercial and industrial uses and open space, trails and other community amenities;
- (g) convenient on- and off-site pedestrian and vehicular circulation;
- (h) opportunities for multi-modal means of transportation; and
- (i) consistency with the Reuse Plan and By-Laws.

2.02: General Provisions

(1) Authority to Undertake a Subdivision. No person shall make a subdivision nor proceed with the Improvement or sale of Lots from a subdivision, the construction or reconstruction of Streets and/or Roads, or the installation and/or extension of Utilities, facilities, and services therein, unless and until a Subdivision Plan has been submitted to and endorsed by the DEC and only then in accordance with 974 CMR 2.00.

(2) Endorsement of Plan. Endorsement of a Level One Plan shall be by the signature of the Director. In the absence of the Director, the signature of the Chairperson shall suffice. Endorsement of a Level Two Definitive Subdivision Plan shall be by the signatures of a quorum of the DEC (seven members) on the first page of the plan, and by the signature of the DEC Chairperson or designee on subsequent pages of the plan.

2.03: Reserved (this section left intentionally blank)

2.04: Level Two Plan -- Definitive Subdivision

(1) Submission Requirements for Definitive Plans. When the Subdivision Plan is submitted with other Unified Permit components, submission of duplicate information shall be minimized. An Applicant for Definitive Plan endorsement shall file the following:

(a) A completed Permit application form.
(b) The required Administrative Fee.
(c) A Certified List of Abutters, including the names and addresses of all property owners within 300‘ of the boundaries of the proposed subdivision as shown on the most recent tax list.
(d) Seven (7) sets of plans and one digital copy of the complete application and plans in a format acceptable to the Director.
(e) A locus plan of the subdivision at a scale of 500‘ to the inch or other appropriate scale as determined by the Director, depicting the exterior lines of all proposed new or substantially upgraded Streets and/or Roads in the subdivision, and clearly showing their location in relation to one or more existing Streets and/or Roads or contiguous portions thereof. Where buildings or other significant structures exist on abutting Lots, they shall be located on the locus plan as well.
(f) A sketch plan showing a possible or prospective Street and/or Road layout for any adjacent un-subdivided land owned or controlled by the Applicant.
(g) A completed and endorsed Stormwater Management Form and drainage calculations in accordance with 974 CMR 4.08(2).
(h) If applicable, a Request for Determination of Applicability (RDA) or a Notice of Intent (NOI).
(i) Copies of all existing Easements, covenants and restrictions applying to the area that is proposed to be subdivided, and applying to areas outside the proposed subdivision where such Easements will be used to provide services to the land proposed to be subdivided.
(j) Soil suitability tests and analysis shall be submitted, describing the locations, elevations, and classification of the soil strata by depth, indicating clearly the depth at which groundwater is encountered, and the date of the tests.

(k) Location of soil suitability test pits along the centerline of the proposed layout. Depth and intervals shall be determined by the Director.

(l) The grading plan shall accurately show the topography and drainage patterns needed to permit future development for each Lot in the proposed subdivision. It shall also show existing grades and grades proposed to permit the construction of the Street and/or Road, driveways and future buildings, and the installation and/or extension of Utilities. Any need to add or remove material to or from the Lot, or to alter drainage patterns in order to fully develop the Lot, in accordance with the By-Laws, shall be quantified and documented for the Definitive Plan.

(m) If new roadways are to remain private, a proposed plan for long term maintenance that the DEC determines is adequate.

(n) A street lighting plan.

(o) Notation of any variance issued as to the land or structures within the parcel giving Devens case number, date granted, and description of the variance.

(p) A list of Waivers requested by the Applicant, identified as Waivers of Submission and Plan Form and Contents requirements or Design Standards, with the applicable section of the Regulations clearly identified or a statement that no waivers are being requested.

(q) If applicable, a plan for the phasing of the construction of the required Improvements, including a description, schedule, and plan showing the location of each phase.

(r) A Stormwater Pollution Prevention Plan, including Erosion, siltation, and dust control measures before and during construction, and appropriate ground cover, seeding, and street sweeping of adjacent public ways.

(2) Plan Form and Contents. The Definitive Plan shall be prepared, signed and sealed by an Engineer. The Plan shall be clearly and legibly drawn in accordance with the recording rules adopted by the Worcester County or Northern Middlesex Registry of Deeds in Massachusetts. The Plan shall be at a scale of 1"= 40' or such other scale as the Director agrees to accept prior to the Plan being submitted. Sheet sizes shall be 24" by 36", with margins of 1½" on the left-hand margins, and all others ¾" or other margins acceptable to the Registry of Deeds. If multiple sheets are used they shall be accompanied by an index sheet showing the entire subdivision. The Plan shall be drawn in black ink on mylar. The Definitive Plan drawings shall contain the following information:

(a) Subdivision name, boundaries, north arrow (indicate whether true, magnetic or grid), locus plan (at a scale not be smaller than 1"= 500'), date, scale, legend, and the title, Definitive Subdivision Plan.

(b) A title block containing the name and parcel designation of the subdivision, the name of the owner of record and the Applicant and

the name, seal and signature of the Engineer or Surveyor, designation of drawing with reference to the matter shown thereon and number of the drawing.

(c) Names and addresses of the Engineer and Surveyor.

(d) Abutting properties labeled with the Assessor parcel number and names of all abutting property owners as they appear in the most recent tax list.

(e) Suitable space for endorsement of the plan by the DEC on the top sheet of the Definitive Plan, and suitable space for signature of the DEC Chairperson or designee on each successive sheet. The top sheet shall also include space for conditions, covenants, notes, etc.

(f) Entire parcel of land being subdivided and all contiguous property in the ownership of the Applicant or in the same ownership as any of the land being subdivided. If the Applicant wishes to have some portion of such land designated in the Definitive Plan as not part of the subdivision, the Applicant must submit to the DEC a determination from the Director that the land so excluded is a legally separate and buildable Lot.

(g) Names, existing improved widths, and exterior lines of existing ways that are bounding, providing Access to, or approaching in close proximity to the subdivision; the boundaries of existing areas dedicated to other public uses and the location and character of existing Easements within or adjacent to and serving the subdivision.

(h) All boundaries of Devens Zoning and Overlay Districts that intersect the proposed subdivision.

(i) All deed lines within the subdivision, if the subdivision includes more than one deed, and the deed references, where available.

(j) Boundary lines, areas in square feet, and dimensions of all proposed Lots with all Lots designated numerically and in sequence, with the new proposed parcel number referenced accordingly.

(k) Proposed street addresses for each new Lot being created.

(l) Sufficient data including lengths, bearings, radii, and central angles to determine the exact location, direction, and length of every Street and/or Road and Right-of-Way line, Lot line, boundary line, and sufficient data to establish these lines on the ground.

(m) Location and outlines of the following:

1. All existing Improvements within the subdivision including buildings, fences, paving, utility lines, walls, and so forth. Where there are existing buildings, they shall be identified as to their proposed use, and the number of existing parking spaces available for the buildings shall be shown.
2. 100 year flood plain and flood plain elevations as shown on the National Flood Insurance Rate Maps issued by FEMA. Within 100’ of the edge of the proposed Right-of-Way, site features such as stone walls, rock outcroppings, fences, trees greater

than 12” in diameter at a height of 3.5’ above the ground, shall be shown. In addition, other areas deemed by the Director to be important for reasons of visual buffering or attenuation of environmental impacts shall also be shown.

3. Wetlands, watercourses, water bodies offsite but abutting the subdivision within 300’, and all private wells located on or within 200’ of the property, and all public and community water supply wells on or within 1,000’ of the property.

(n) Boundaries of any Resource Areas. For any Lot that contains such wetland areas, the area in square feet of wetlands contained within the boundaries of the Lot shall be shown.

(o) Location of all permanent monuments properly identified as to whether existing or proposed, stone bounds to be set at tangent points and at turning points on way lines and property lines.

(p) Boundaries of any existing area or areas proposed to be dedicated to public use. The DEC may, at its discretion, allow the Applicant to dedicate land as conservation areas or trail Easements, when conservation agreements and deed restrictions are created in favor of a qualified and responsible entity or organization.

(q) Existing and proposed topography for the entire subdivision at a contour interval of not greater than 2’ or such other interval as may be approved by the DEC prior to the submission of the plan. Existing contours must be shown extending 100’ beyond the property to be subdivided.

(r) Layout of the proposed storm and surface drainage system showing the size and location of existing and proposed surface and subsurface water Drains and their appurtenances. The plan shall be designed to intercept stormwater run-off along Streets and/or Roads at intervals reasonably related to the surface type, grade, and acreage area drained. The Applicant shall also provide the supporting data and design analysis, including plans and profiles showing the location and size of LID features, Drain lines, culverts and trenches, design of catch basins and manholes, proposed connections to the existing drainage system and such other information as may be required to describe the drainage. All such information shall be stamped and signed by an Engineer.

(s) Special drainage construction features, deviating from or not covered by standard specifications, on detail drawings. Such detail drawings may be incorporated as part of a utility plan or profile or may be executed on a separate sheet or sheets, and shall provide information as to dimensions, locations, inverts, rim elevations, elevations, materials, and so forth, of the construction details involved. The requirement for detail drawings shall be applicable, but not limited to, bridges, culverts, permanent and interim drainage Improvements, structurally stabilized slopes, utility piping encased in concrete, swales and brooks shaped or constructed to a definite cross-section, dams and spillways, steps

within the exterior lines of the Street and/or Road and similar construction features.

(t) Layout of the proposed water supply and wastewater systems showing the size and location of existing and proposed lines and their appurtenances. The Applicant shall also provide supporting data and design analysis, including plans and profiles, as may be required to describe the water and sewer systems.

(u) Water and sewer service laterals reflecting tie-ins and appropriate connections to existing and proposed Lots reflected on the subdivision. The Plan shall also show elevation of sewer laterals for each connection to a newly proposed Lot, generally at the property line.

(v) Lowest floor elevation of structures on each Lot in the proposed subdivision.

(w) Location and base elevation of existing and proposed fire hydrants.

(x) Names, widths, and exterior lines of proposed Streets and/or Roads, the boundaries of other proposed public areas within the Definitive Plan, and the location and type of proposed Easements within or adjacent to the subdivision. Street and/or Road names shall be in keeping with the character and history of Devens and be supplied by and approved by the DEC. The developer shall also provide historic ovals. The DEC will provide the content and format of the historic ovals to the developer.

(y) Methods to minimize the number of curb openings into Streets, including common driveways and Roads (alleys). Easements and maintenance agreements between the parties sharing the facility shall also be provided and a traffic analysis may be required to demonstrate sufficient capacity in the common driveway or Road (alley).

(z) Location of existing or proposed underground Utilities such as gas and electric lines, and other underground conduits or cables, and any proposed underground connection points to existing or future planned public services. Applicants shall consult with MassDevelopment Utilities Department for minimum utility requirements for existing, proposed and future utility connections.

(aa) The proposed location of Street and/or Road lighting within the subdivision. The design and specifications of such lighting shall be submitted and included on detail sheet.

(bb) Where no Site Plan is being concurrently submitted with the Definitive Plan, the information required should be depicted on separate sheets. The following general groupings are suggested where the information cannot readily be shown on a single plan:

1. Boundaries of the subdivision, names of abutters, proposed Right-of-Way including travelway, shoulders, sidewalks, planting strips and any improved areas beyond, Lot lines, areas and dimensions, Easements, adjacent streets, zoning districts, driveways, monuments, and so forth

2. Proposed Lot lines, topography, grading, watercourses and water bodies, wetlands, existing Improvements, natural site features, and similar information.
3. Proposed Lot lines, utility installations including structures, Easements, and so forth
4. Some information, such as the location of Lot lines and the Right-of-Way shall be located on each sheet in order to permit the various sheets to be related to each other.

(3) Form and Content of Way and Profile Plans. For the purposes of 974 CMR 2.00, Right-of-Way refers to total area of Streets and Roads including travelway, shoulders, sidewalks, planting strips and any improved areas beyond. A "way" may be either public or private. The following must be shown on way and profile plans:

(a) Separate layout plan for each proposed Street and/or Road in the subdivision, at a horizontal scale of 1"= 40', showing for each Street and/or Road the proposed exterior lines, centerline, points of tangency, length of tangents, length of curves, intersection angles, radii of curves, and the location of permanent monuments and benchmarks, together with all Lot lines, buildings, and other major features within 40' of the exterior lines of such Street and/or Road. The layout plan shall also show the size and location of existing and proposed Utilities, together with their appurtenances. All water gate boxes, mains, and service shall be shown with the tie-ins so they may be located by measurements. Sidewalks and planting strips shall also be shown on the layout plan if proposed or required for the subdivision.

(b) Cross-section or sections of each roadway, shall be properly located and identified by station number. The sections shall show sidewalks, Utilities, depth of Utilities, depth of gravel, crown of road, thickness of surface and materials. Slope of the side of the Right-of-Way to the property line shall also be shown.

(c) A profile directly above or below the layout plan of each proposed Street and/or Road, at a horizontal scale of 1" = 40' and a vertical scale of 1" = 4'. The profile for such Street and/or Road shall show existing centerline grades in fine solid lines, existing exterior right side line in fine long broken lines, existing exterior left side line in fine short broken lines, and proposed finished centerline grades in heavy solid lines. Proposed grade elevations shall be shown by figures at beginning and end, and at 50' stations, except on vertical curves where they shall be shown at 25' stations. Rate of gradient in percentage shall also be shown. All elevations shall refer to National Geodetic Vertical Datum (NGVD) of 1929, unless in the opinion of the DEC, suitable benchmarks are not readily available, and alternative benchmarks are authorized by the Director prior to the submission of the plans. Profiles shall also indicate the location of any intersecting public or private ways, and the location of existing and proposed storm drains, water mains, and sewers

and their appurtenances, and other Utilities. The profile shall show the rates of grade for sewers, storm Dains, and water mains.

(d) Material type for existing and proposed storm Drains, water mains, and sewers, conforming to the material specifications of 974 CMR 2.00.

(e) Proposed centerline profile of each way, showing the elevations of intersections of tangents, 50' stations, rates of slope, vertical curves, and data pertaining thereto in figures for each 25' station.

(f) High points and low points of vertical curves, calculated and shown on said profiles.

(g) Profiles on Easements and on the exterior lines of ways at a horizontal scale of 1" = 40' and vertical scale of 1"= 4', or such other scale as the Director deems appropriate. All subdivision profiles and road grade levels will be established using certified benchmarks within Devens and tied to the Massachusetts Coordinate System or as directed by MassDevelopment Engineering.

(4) Review and Decision

(a) Decision: If the DEC determines that the Definitive Plan:

1. meets the Review Criteria and the Street and Road Design Standards, it will approve or conditionally approve the Plan.
2. If the plan does not meet one or more of the Review Standards and Criteria or the Street and Road Design Standards it will disapprove the Plan and state in writing why the Plan does not comply.

(b) Review Criteria.

1. The Definitive Plan shall comply with the following :
   a. Compliance with the applicable provisions of 974 CMR 2.00, 3.00 and 4.00 and 5.00 and Bylaws as they pertain to ways.
   b. The Submission is Complete.
   c. All new Streets and/or Roads and intersections align and connect with existing ways to ensure free movement of pedestrian, bicycle and vehicular traffic.
   d. Provision has been made for the future extension of water, sewer, gas, electric, and stormwater systems and Streets and/or Roads to adjoining property unless the DEC determines this is not in the public interest.
   e. Water and wastewater systems and other required Utilities are properly sized and located and have adequate capacity for servicing the subdivision.
   f. Names of Streets and/or Roads are selected from the list of Devens-approved street names.
   g. Trails are provided as shown on the Trail Master Plan.
   h. Street lighting is adequate
   i. All Streets and/or Roads have minimized the number of curb openings and have sufficient capacity and the

necessary Easements, bonding and/or maintenance agreements.

j. Soil testing indicates that the soils are capable of supporting the roads, infrastructure and associated structures shown on the plans.

(5) Conditions. The DEC may require conditions necessary to cause the Definitive Plan to comply with the Review Criteria. Conditions the DEC might impose include:

(a) Completion of proposed ways and extension and/or installation of the proposed Improvements within the period specified by the DEC or agreed to by the Applicant.

(b) Slope Easements and/or retaining walls to provide for more gradual slopes and to support the Street and/or Road or adjacent land. Construction of retaining walls in accordance with MassDOT standards.

(c) Common portions of the water, sewer, drainage, and roadway systems be offered for public acceptance. The DEC may alternatively require that common portions of the systems be privately maintained; and, if such systems are required or proposed to be private, in perpetuity, the Applicant must provide for their long-term maintenance in a manner that is satisfactory to the DEC.

(d) Construction of off-site Improvements involving the extension and/or modification of Streets and/or Roads, utility or drainage systems beyond the project if the DEC finds that the proposed subdivision will create significant capacity, safety or environmental problems within the Public Infrastructure in Devens. Any required off-site Improvements shall be located within Devens. Specifically, the following types of off-site Improvements might be required:

1. Construction or modification of ways to ensure adequate capacity, efficiency, or safety of vehicular, bicycle, and/or pedestrian flow.
2. Installation of Improvements or segments within utility collection or distribution systems designed to increase their capacity or enhance performance.
3. Extension or modification of drainage collection or discharge Improvements in order to provide sufficient capacity for Lot-related runoff.
4. Installation of protective measures to safeguard off-site Resource Areas.

2.05: Amending or Reconsidering a Definitive Subdivision Plan

(1) No amendment of a Definitive Plan shall affect the Lots in a subdivision that have been sold or mortgaged in good faith and for a valuable consideration subsequent to the endorsement of the plan, or any rights appurtenant to the Lots, without the consent of the owner of such Lots,

and of the holder of the mortgage or mortgages, if any, for such land. However, the DEC may approve a request to amend an endorsed subdivision without the consent of the Lot owners and mortgagors, if the DEC makes a finding that the proposed amendments do not affect any Lots or rights appurtenant to the Lots or when there has been a sale to a single grantee of either the entire parcel of land shown on the subdivision plan or of all the Lots not previously released by the DEC.

(2) Recordation of an Amendment. No amendment shall take effect until the amended plan and the Certificate of the DEC's vote have been recorded in the Registry of Deeds or for registered land, verified by the Land Court.

2.06: Implementation of an Approved Definitive Subdivision Plan

(1) Provision of Performance Guarantee. Prior to endorsement by the DEC of a Definitive Plan, the DEC shall require that the Applicant file with the DEC a performance guarantee to secure the construction of ways and the installation and/or extension of services.

(2) Conveyance of Utilities and Services.Before the DEC will release a surety bond or deposit, or in the case of a covenant, issue a Certificate of Performance for subdivisions in which the ways and Utilities are proposed to be offered for acceptance, the developer shall execute an instrument transferring to MassDevelopment unencumbered title to all sanitary sewers, stormwater Drains, water mains, and all appurtenances thereto constructed and installed in the subdivision. The developer shall also convey to MassDevelopment, without cost and free of all liens and encumbrances, perpetual rights and Easements to construct, inspect, repair, renew, replace, operate, and forever maintain such sanitary sewers, stormwater Drains, water mains, and all appurtenances thereto and to do all acts incidental thereto, in, through, and under the whole of all Streets and/or Roads in the subdivision, and if such sewers, stormwater Drains, water Drains, and water mains have been constructed and installed in land not within such Streets and/or Roads, then in, through, and under the Easements, as shown on the Definitive Plan, and where no Easements are shown, in, through, and under a strip of land extending 10’ in width on each side of the centerline of all such sewer Drains and water mains.

(b) The above shall not be construed to relieve the Applicant of responsibility to complete all construction, as required by Applicant's covenants and agreements with MassDevelopment, and to thereafter maintain all ways and Utilities in a satisfactory condition until they are accepted by MassDevelopment.

(c) Approval by the DEC of the Improvements required for a Definitive Plan does not constitute the laying out or acceptance by MassDevelopment of any ways or paths within a subdivision.
(d) The Applicant shall retain title to each way, path, or Easement in or appurtenant to the subdivision until conveyed to and accepted by MassDevelopment;

(3) If the Applicant chooses not to offer the Right-of-Way and other Access Easements to MassDevelopment, this shall be noted on the Definitive Plan and the Applicant shall propose and implement mechanisms for perpetual maintenance. Such plan shall include, but not be limited to snow plowing and/or removal, ice control, and management and maintenance of stormwater system(s), landscaping, sidewalks, paving and curbing signage, Utilities and parking/traffic control.

(4) Endorsed and As-Built Plans.
(a) Upon endorsement of a Definitive Subdivision Plan, the Applicant shall provide copies of the endorsed plan to the DEC for its record and use. The plan shall also be submitted in a digital format acceptable to the DEC.
(b) As-Built Plan. Upon completion of construction, and before release of a performance guarantee, the DEC may require the Applicant to prepare and submit As-Built Plans at the same scale as the Street and/or Road plans, which shall indicate all of the following:
1. Boundaries of the Right-of-Way;
2. Location and elevations of roadway Improvements;
3. Driveway locations;
4. Permanent monuments;
5. Location and inverts, with elevation, of the required Utilities, hydrants and drainage including the location, with ties, and depth of sewer and water laterals serving each Lot;
6. Location of any other underground Utilities, such as natural gas, electricity, telephone lines, and street lighting;
7. Lot boundaries; and,
8. Centerline stationing.

The Applicant's Surveyor or Engineer shall certify that the ways and services as shown in the As-Built Plans are complete and the As-Built Plans are accurate. The DEC shall accept the As-Built Plans upon determining that their content and form comply with 974 CMR 2.00.

(5) Street Acceptance Plan. For Ways proposed for acceptance, the Applicant shall have prepared and submitted a Street Acceptance Plan prior to the final release of the performance guarantee. Such plans shall be suitable for recording at the Registry of Deeds and acceptable to MassDevelopment. At a minimum, a Street Acceptance Plan shall contain the following information:

(a) Streets and/or Road intersections shall be designed to ensure free movement of Pedestrian, bicycle and vehicular traffic.
(b) Streets and/or Road intersections shall align and connect with existing ways at 90 degree angles to the maximum extent feasible. Streets and/or Roads shall not have intersecting angles less than 60 degrees.
(c) All intersection designs shall comply with MassDOT, Highway Division, Project Development & Design Guide, 2006 (MHD).

(6) Stormwater Management.
(a) Overview: Stormwater Management within subdivisions generally consists of the control of stormwater runoff within ways. It is characterized by common, multiple user drainage collected in the ways and directed towards appropriate receptors. MassDevelopment will usually maintain or oversee maintenance of these public stormwater management systems.
(b) All Stormwater management systems shall comply with 974 CMR 4.08.
(c) The stormwater management system for the subdivision may be designed and constructed to include drainage and run-off from developed sites as well as the roadway. The Director may require the Applicant to provide a stormwater management plan for the entire subdivision at full build-out to minimize the total number of detention/retention basins.
(d) Maintenance of Stormwater Improvements in Private Ways. Where the DEC requires that road maintenance be done by the Applicant, the following schedule applies:
1. Biannual inspection of detention/retention and infiltration facilities for Erosion, debris, sand deposits, and vegetative growth. Vegetation shall be cut back annually, as appropriate, and debris or sediment removed from the basins.
2. Submission of an annual report to the DEC by the Applicant of the detention/retention basin to the DEC indicating that maintenance issues have been adequately addressed and that corrective measures were made where necessary.
(e) Refer to 974 CMR 4.08 for Design Standards and Criteria for Certain Structural LID Techniques. For combined public/private systems, Applicants shall obtain authorization from MassDevelopment Engineering and Public Works for private connections into public systems.

(7) Landscape Treatment within Street/Road Rights-of-Way
(a) Purpose. When a new Street and/or Road is built or substantially upgraded, the Applicant shall provide street trees and planting strips.

Chapter 3 SITE PLAN APPROVAL

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3.01: Purpose, Process, and Goals

(1) Site Plan Approval is the component of the Unified Development Permit System that manages the placement of structures and improvements on the project site. The Applicant shall follow the procedures for Level Two review in 974 CMR 1.00.

(2) The goals and objectives of site planning at Devens are:

(a) To fit development to the land, minimize alterations to natural terrain and to soften the visual impact of development as viewed from Streets and Roads.

(b) To protect natural resources, including groundwater and surface water resources, wildlife habitats, wetlands and other Resource Areas and whenever possible, enhance ecological systems.

(c) To respond to present and future needs and uses, enable adaptive reuse and density changes over time without compromising sustainability.

(d) To be energy-efficient, both during construction and over time.

(e) To integrate economic, social, and environmental concerns.

3.02: Requirements

(1) Site Plan Approval is required when a proposed project involves one or more of the following:

(a) Construction of a new building, regardless of land use;

(b) Extension or increase in the area of a nonconforming use in an existing building;

(c) Construction or expansion of a parking lot, structure, or loading dock;

(d) Construction of an ancillary building on-site (denoting use for storing equipment, maintenance supplies, and similar items, or for housing building systems equipment), if the building contains more than 800 square feet of gross floor area; and

(e) Construction of a project that will result in changes to the existing land surface area of 10% or more of the lot size.

(f) Construction or improvement(s) of Streets and/or Roads in conjunction with residential developments.

(2) Submission Requirements. When the Site Plan is submitted with other Unified Permit components, submission of duplicate information shall be minimized. Specific submission requirements shall be established by the Director during the scoping session prior to the pre-permitting conference. An Applicant for Site Plan review shall file the following:

(a) A completed Permit Submission form.
(b) The required Administrative and Peer Review Fee.
(c) Seven (7) copies of the Site Plan, unless another number of plans has been specified by the Director. A digital copy of the Site Plan and all supporting information shall also be provided, in a format approved by the LUA.
(d) A List of Abutters, certified if abutters are not located in Devens and a sketch plan showing the proximity of the abutters to the site.
(e) Stormwater management design and accompanying drainage calculations and Stormwater Operations and Maintenance Plan prepared by an Engineer in accordance with 974 CMR 3.04(4) and 974 CMR 4.08.
(f) Request for Determination of Applicability (RFD) or a Notice of Intent (NOI) shall be submitted in accordance with Article XII of the By-Laws and 974 CMR 1.05.
(g) Copies of all existing Easements, covenants, restrictions and Institutional Controls applying to the lot.
(h) Soil suitability tests and analysis.
(i) A list of Waivers requested by the Applicant, identified as Waivers of Submission and Plan Form and Contents requirements or Design Standards, with the applicable section of the Regulations clearly identified or a statement that no waivers are being requested.
(j) Copy of any variance applying to the land, granted or filed concurrently with the Site Plan.
(k) A narrative demonstrating compliance with the Reuse Plan and By-Laws meeting the specifications of 974 CMR 1.02.
(l) If proposed by the Applicant, a plan for the phasing of the construction of the required improvements, including a description, schedule, and plan showing the location of each phase.
(m) A written statement of compliance with the Devens Open Space and Recreation Plan (DOSRP) and the Devens Main Post Trails report dated July 2001, to determine the effects, if any, of proposed development on Resource Areas, proposed trail Rights-of-Way, active and passive recreation areas, and other amenities included in the DOSRP.

(n) If an Applicant proposes parking lot construction phasing, a written statement demonstrating that the portion to be constructed is sufficient for the needs of the users of the proposed structure, comparing the number of spaces required by the By-Laws to the number the Applicant believes are adequate, written certification that no building or permanent accessory structure will be placed on the area reserved for additional parking spaces, and a draft covenant that the parking will be built when the DEC determines it is required.

(o) An estimate of the number of vehicle trips daily and for the morning and evening peak periods (trip generation rates shall be based on the ITE "Trip Generation Manual" most recent edition, and, if applicable, data about similar developments in Massachusetts) and a description of traffic mitigation measures proposed including traffic management plans, trip reduction methods, and car/vanpooling preferential parking. The LUA may require a traffic study. In all cases, Applicants shall provide a written statement agreeing to participate in the Devens Transportation Demand Management Program (TDM) to reduce single occupancy vehicle trips and promote alternative forms of transportation.

(p) An erosion and sedimentation control plan as per 974 CMR 3.04(4) and the Devens Stormwater Pollution Prevention Plan.

(q) A landscape treatment maintenance and water management plan as per 974 CMR 3.04(8)(m).

(r) A narrative demonstrating compliance with the Industrial Performance Standards.

(s) The sustainable sites section of US Green Building Council LEED™ Green Building Rating System™ Checklist (http://www.usgbc.org/) most recent version, the remainder of the completed checklist to be submitted when the building permit application is submitted. For residential projects, Applicants shall submit a completed copy of the most recent version of the LEED for Neighborhood Development Checklist (all sections at time of application).

(t) Building elevations or perspectives of those portions of the building visible from Streets and residential and open space zoning districts showing the general appearance, massing, building materials, proposed colors, and relationship to abutting premises, and, prior to the Public Hearing, the design review letter from Mass Development.

(u) Building design review materials and if located within the Viewshed District, viewshed impact analysis.

(v) All Slope Resource Areas as identified in 974 CMR 3.06 Appendix B Figures (13) Figure M within the proposed plan area shall be shown on the site plan.

(w) Climate change mitigation, adaptation and greenhouse gas emissions mitigation measures in accordance with the requirements of 974 CMR 4.11.

(x) Residential projects shall comply with the applicable provisions of 974 CMR 2.04, 2.06 and 2.07, 974 CMR 5.00, and include the following:

1. Location and proposed uses of Open Space and a narrative demonstrating compliance with the DOSRP.
2. List the number of Single, Two-Family, and Multi-Family Dwelling Units, whether they are rental and or for sale, and the number of bedrooms for each Dwelling Unit.
3. Show on a plan, the location of each type of Dwelling Unit.
4. Provide model drawings of all housing styles.
5. List the number and style of Moderate-Income Dwelling Units and show where they will be located.
6. Provide a narrative and plans of methods (including traffic calming measures) to be used to foster the creation of a Universal Design, pedestrian and bike-friendly community, to control truck and non-resident traffic through the development, and to control vehicle operating speeds at or below the design speed limit(s).

(3) Plan Form and Contents.

(a) Surveying and Drafting Plan Requirements. The Site Plan shall be 24”x 36” and at a scale of 1”= 40’, unless an alternative scale is authorized by the Director. The Site Plan must comply with 974 CMR 2.04(3), Plan Form and Contents, and conform to the Registry of Deeds requirements for recording. The Site Plan must also show:

1. The names and addresses of the record owner of the land and the Applicant and the name, seal, and address of the designer, Engineer, Surveyor, and Registered Landscape Architect who made the plan, all of which shall appear in the lower right-hand corner.
2. The name of the development, scale, date of plan, and legend.
3. A locus plan indicating the general location of the site in relation to all adjacent and nearby roads, railroads, and waterways.
4. Ties from the development site to the nearest town and county bounds if within 1000’ of the site. Bearings and curve data/distances of all lot lines, names of all adjoining property owners as they appear in the most recent tax list, and the location of Easements, Rights-of-Way, and public and private ways.
5. Devens Parcel ID number, if available.

6. Topography for the entire site in 2' intervals with contours and principal elevations of significant existing and proposed features related to the National Geodetic Vertical Datum (NGVD) of 1929. Existing contours shall be shown as dashed lines and, along with all other existing features, shall be screened. Proposed contours are to be shown as solid lines.
7. A space for the DEC's endorsement of the Site Plan by a majority of the members of the DEC on the front sheet and space for the chairperson or designee to sign all other sheets.
8. Lines of existing abutting Streets and Roads showing drainage and driveway locations and curb cuts.
9. Surveyed property lines showing distances and monument locations, all existing and proposed Easements, Rights-of-Way, utilities and other encumbrances, the size of the entire parcel, and the delineation and number of square feet of the land area to be disturbed.

(b) Administrative Plan Requirements. The Site Plan shall also include:

1. Zoning district(s) and any boundary of zoning districts within the site, along any existing or proposed lot line, or within 50'.
2. The location, dimensions (including height), and general use of all existing and proposed buildings and structures to remain, including ground coverage, gross floor area, open area uses, and other facilities and improvements. Location of buildings existing on the site to be developed and on adjacent land under the same ownership within 500' of the lot line, indicating whether existing buildings are to be retained, modified or removed.
3. A statement noting the area of the site, the percentage of the site to be covered by impervious surfaces (such as buildings and parking areas), the area to be devoted to open space, the area to be paved for Streets, Roads, parking, driveways, loading spaces, and sidewalks, the number of proposed parking spaces and the number required by the By-Laws, the number of employees expected per shift, and the gross floor area of each proposed (commercial, industrial, office, or other) use. This data shall be tabulated to show the relationship of the required versus the proposed quantities.
4. Existing and proposed Front, Side, and Rear Yard setback dimensions.
5. Driveways, parking lots and loading docks, showing entrances and exits designed for safe ingress and egress,

curb cuts, layout of parking spaces, aisles, off-street loading facilities, pedestrian walks, bicycle racks or storage facilities, handicap ramps, and representative cross-sections of service and parking areas and driveways.

6. Landscape Treatment:
   a. Existing and proposed landscape features such as street trees, fences, walls, planting areas, wooded areas, and walks. Scattered trees to be preserved shall also be shown as well as all "specimen trees" (trees exceeding a minimum caliper of 12” within 100’ of existing or proposed lot lines have been identified and indicated on the plan. All existing landscape features, especially existing trees and woodland to remain, shall be shown on ALL site plan sheets, such as site preparation and demolition, layout, grading, utilities, and erosion control, as well as planting plans. Landscaping Plans, Planting Plans, Planting Detail sheets, Landscape Maintenance Plans, and Planting Specifications shall be prepared by a Landscape Architect registered in the Commonwealth of Massachusetts and shall bear the seal and signature of the Registered Landscape Architect who prepared them.
   b. Planting Plans shall indicate the locations of proposed Street, Road and site lighting, even if site lighting is shown elsewhere on a separate plan and designed by separate consultant. Planting plans shall also include details and locations for walks, walls, and fences including dimensions, materials, and finishes.
   c. Quantities, species, and spacing of plantings in lot setback areas, screens, parking and loading areas, and other landscaped areas shall be shown at a minimum scale of 1”=40’. Detail plans for areas such as landscape treatments adjacent to buildings, tree clusters or shrub beds, landscaped islands in parking areas, or other densely landscaped areas shall be shown at a scale of 1”=20’.
   d. If an irrigation system is proposed, the Submission shall include an irrigation plan complying with 974 CMR 8.09(11) showing the complete layout and of all components, complete schematic diagrams of all systems, a functional and sequential description of all systems, and irrigation details for installation of all components, including but not limited to piping, valves, valve boxes, sprinkler heads, backflow preventers, automatic control systems, pumps, meters, associated cabinets, and all appurtenances as needed.

7. Proposed means of fire equipment access.
8. Proposed traffic circulation systems, including the volume and proposed direction of traffic flows into, out of, and within the site for both vehicles and pedestrians for an average day and for peak hours.
9. Location and dimensions (including height) of all storage facilities for equipment, material, and other like items and the location of all aboveground and underground fuel, combustible, and flammable liquid storage tanks greater than 250 gallons.
10. Location and dimensions (including height) of facilities for garbage, rubbish, recycling, and other waste collection and disposal.
11. Garage and pedestrian entrances and exits.
12. Maximum size vehicle, including trailers, expected to use the site after construction, by length, width, height, and American Association of State Highway and Transportation Officials (AASHTO) designation.
13. Location and dimensions (including height) of existing and/or proposed free-standing signs and the manner of illumination. All proposed signs shall conform with Article XIII of the By-Laws and 974 CMR 6.00: Sign Control.
14. Existing and proposed public and private utilities, above and below grade, along with their type, size, and class.
15. If the project is to be phased, a plan for the phasing of the construction of the required improvements, including a description, schedule, and plan of affected areas.
16. Any additional details that may be pertinent or required by the Director during the scoping or Pre-Permitting sessions.

(c) Industrial Performance Standards Plan Requirements.

1. The site lighting information shall be provided on the Site Plan, including types of fixtures, heights, wattage, foot candle output directly under the light source, foot candle output at the lot line, and a photometric layout/diagram showing direction and intensity of outdoor lighting. The plan shall also designate which lights (if any) shall remain on overnight (between 11 p.m. and 7 a.m.) to provide adequate illumination for night operations.
2. Notes shall be provided on the Site Plan stating:
   a. Existing or proposed use will not generate electromagnetic interference to any sensitive receptor. Interference with the Harvard-Smithsonian radio telescope (1400-1720 MHz) is specifically prohibited.
   b. Proposed or existing use will not cause pronounced, multiple patterns of noise or vibration nuisance to, or interfere with, any sensitive receptor.

c. Either “A Massachusetts Department of Environmental Protection (DEP) air quality permit application has been made” or “A DEP air quality permit is not required.”

3. Locations or uses deemed by the Director to be sensitive receptors in any given area of impact may be subject to field identification of the receptor and/or special documentation or field data that helps to clarify the existence or absence of subject impacts. This documentation and data includes existing secondary data and studies, limited field testing by the Applicant, or in the worst case scenario, retention of additional professional consultants to conduct further testing. Specifications for any additional information will be identified by the Director during the pre-permitting conference and shall be incorporated in the Site Plan Submission.

(d) Resource Areas/Flood Plain Plan Requirements. The Site Plan shall include:

1. All Resource Areas as defined by 974 CMR 4.06, , Federal Emergency Management Agency (FEMA) flood plain elevations on and/or adjacent to the lot, Flood Insurance Rate Map (FIRM) panel number, zone designation, and base flood elevation;
2. Erosion and Sediment Control Plan in accordance with 974 CMR 3.02(3)(e);
3. Location of all private wells on or within 200’ of the boundaries of the property;
4. Location of all public and community water supply wells on or within 1,000’ of the boundaries of the property;
5. Proposed conservation restrictions and Easements, if any;
6. For any site plan that stores fuel, combustible and flammable liquids, as defined by 42 U.S.C. section 6901-6922i, G.L. c. 148, and 527 CMR 9.00, compliance with 974 CMR 4.09 and an addendum to the DSPCC and the location of on-site materials and equipment for spill response in accordance with its specific DSPCC are required.

(e) All site plan submissions shall include an Erosion and Sediment Control Plan containing sufficient information to describe the nature and purpose of the proposed development, pertinent conditions of the site and the adjacent areas, and proposed erosion and sedimentation controls. The plan shall include such detail as is necessary to demonstrate that the proposed development will comply with Massachusetts Department of Environmental Protection Stormwater Management Standards, the Devens Stormwater Pollution Prevention Plan and 974 CMR 3.04 design standards. The

Erosion and Sediment Control Plan shall also include the following:

1. Location and description of Resource Areas including:
   a. Watercourses and water bodies, wetlands (including a 100' upland review area, riparian zones and all floodplain information, including the 100-year flood elevation based upon the most recent Flood Insurance Rate Map;
   b. Existing vegetation including tree lines, shrub layer, ground cover and herbaceous vegetation, and trees with a caliper 12" or larger, noting specimen trees and forest communities;
   c. Habitats mapped by the Massachusetts Natural Heritage & Endangered Species Program as Endangered, Threatened or of Special Concern, Estimated Habitats of Rare Wildlife and Certified Vernal Pools, Potential Vernal Pools, and Priority Habitats of Rare Species within 500' of any construction activity.
2. Existing soils (type, hydrologic group, erodibility) and the volume and nature of imported soil materials.
3. Drainage patterns, watersheds and sub-watersheds, with calculations of proposed land disturbance within each sub-watershed and areas of soil to be disturbed in each watershed throughout the duration of the proposed land disturbance activity.
4. A description of construction and waste materials expected to be stored on-site. The Plan shall include a description and details of controls to reduce pollutants from these materials, including storage practices to minimize exposure of the materials to stormwater, and spill prevention and response.
5. Location and details of all erosion and sediment control measures with a narrative of the construction sequence/phasing of the project, including both Operation and Maintenance for structural and non-structural control measures and best management practices, interim grading, and material stockpiling areas in accordance with the Devens Stormwater Pollution Prevention Plan and Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas. Such narrative and Operation and Maintenance Plan for temporary and permanent erosion control measures during Construction, shall be included on the erosion and sediment control plan and include but not be limited to, the following requirements:

a. Prior to any land disturbance activities commencing on the site, the Applicant/contractor shall be responsible for physically marking the limits of construction on the site with tape, signs, or orange construction fence, so that workers understand the areas to be protected. The physical markers shall be inspected daily and repaired as necessary throughout the duration of the project.
b. Perimeter sediment control system shall be installed prior to soil disturbance and maintained to contain soils on-site. Areas outside of the perimeter sediment control system must not be disturbed unless the Applicant has obtained prior approval from the DEC.
c. Measures shall be taken to control erosion within the project area. Sediment in runoff water shall be trapped and retained within the project area and street sweeping of adjacent Streets and Roads shall be included where necessary.
d. All Resource Areas shall be protected from sediment.
e. Monitoring and maintenance of erosion and sediment control measures throughout the course of construction shall be required. Sediment shall be removed once the volume reaches ¼ to ½ the height of the erosion control.
f. Divert runoff from offsite and undisturbed areas away from construction to minimize soil erosion and sedimentation on and off-site. Temporarily stabilize all highly erodible soils and slopes immediately.
g. Land disturbance activities exceeding two acres in size shall not be disturbed without a sequencing plan that requires stormwater controls to be installed and exposed soils stabilized, as disturbance beyond the two acres continues. A construction phasing plan, including erosion and sediment control plan for each phase, shall be submitted to the DEC prior to any construction on the site. Mass clearings and grading of the entire site shall be avoided.
h. Soil stockpiles must be stabilized or covered at the end of each workday. Stockpile side slopes shall not be greater than 2:1. All stockpiles shall be surrounded by sediment controls.
i. Disturbed areas remaining idle for more than 14 days shall be temporarily or permanently stabilized.
j. Permanent seeding shall be undertaken in the spring from March through May, and in late summer and early fall from August to October 15. During the peak summer months and in the fall after October 15, when seeding is found to be impractical, an appropriate temporary mulch

and/or non-asphaltic soil tackifier with winter rye shall be applied. Permanent seeding may be undertaken during the summer if plans provide for adequate mulching and watering.

k. Anti-tracking pad(s) shall be constructed at all entrance/exist points of the site to reduce the amount of soil carried onto roadways and off the site. Dust shall also be controlled at the site.

l. All slopes steeper than 3:1 (h:v, 33.3%), as well as perimeter dikes, sediment basins or traps, and embankments must, upon completion, be immediately stabilized with sod, seed and anchored straw mulch, or other approved stabilization measures.

m. Temporary sediment trapping devices must not be removed until permanent stabilization is established in all construction areas associated with the project. Similarly, stabilization must be established prior to converting temporary sediment traps/basins into permanent (post-construction) stormwater management facilities. All facilities used for temporary measures shall be cleaned and re-stabilized prior to being put into final operation.

n. All temporary erosion and sediment control measures shall be removed after final site stabilization. Disturbed soil areas resulting from the removal of temporary measures shall be permanently stabilized within 30 days of removal.

6. Other applicable controls and/or information as may be required by the DEC.
7. All plans, reports and calculations required as part of the erosion and sediment control plan must be stamped and certified by a professional engineer.
8. Projects disturbing one acre or more are required to obtain a Construction General Permit (CGP) from the US EPA. A copy of the CGP must be filed with the DEC prior to issuance of a building permit for all applicable projects.

3.03: Review and Decision

(1) Review. The DEC shall follow 974 CMR 1.04 to review a Site Plan.

(2) Review Criteria. The DEC shall approve a Site Plan if it meets the following criteria:

(a) The Site Plan complies with 974 CMR 3.00 and with the applicable provisions of the By-Laws.

(b) The development lies on a lot that is or will be recorded at the Registry of Deeds.
(c) The Submission is Complete.
(d) All Streets and Roads, driveways, parking lots, loading areas, paths, and sidewalks, are designed to provide for safe multi-modal travel in accordance with 974 CMR 2.07, the Americans with Disabilities Act of 1990 (ADA) and the MA Architectural Access Board Regulations (521 CMR).
(e) Access and site circulation enables prompt fire, police, and emergency response.
(f) Adequate capture and discharge of stormwater and surface water runoff and compliance with applicable portions of the "Devens Stormwater Pollution Prevention Plan" has been achieved
(g) Connections with utility, power and communication systems available in the abutting infrastructure have been made.
(h) Applicable facilities required under the Water Resources Protection By-Law and the related Design Standards have been included.
(i) Landscape Treatment Design Standards for plant materials, planting strips, screening, and preservation of existing specimen trees and wooded areas have been met.
(j) A wetlands Order of Conditions has been issued or determined not required.
(k) Applicable Industrial Performance Standards have been adhered to.
(l) Sufficient parking for current needs has been provided.
(m) Adequate traffic mitigation and control measures have been proposed.
(n) Participation in the Devens Transportation Management Initiative has been agreed to.
(o) Adequate water supply exists in terms of quantity, quality, and water pressure for commercial and/or domestic needs and fire protection and the use of potable water for irrigation has been minimized to the maximum extent feasible.
(p) Connection to sanitary sewers has been made.
(q) Building design meets the minimum standards as established by MassDevelopment for the district in which the lot is located.
(r) Soil testing indicates that the soils are capable of supporting proposed development.
(s) The development has been designed with due consideration for public health.
(t) Adequate climate change mitigation, adaptation and greenhouse gas emissions mitigation measures have been incorporated in accordance with 974 CMR 4.11.

(3) Conditions. The DEC may impose conditions so that the Site Plan complies with the Review Criteria and 974 CMR 3.04. Conditions the DEC might impose include:
   (a) The completion and installation of the proposed improvements within a period specified by the DEC or agreed to by the Applicant.
   (b) The extension of water, sewer, and drainage systems to the undeveloped land abutting the site to allow for future connection with the public systems.
   (c) Measures to ensure compliance with earth removal provisions in 974 CMR 4.07.
   (d) Measures to ensure compliance with any Institutional Controls located within the boundary of the site.
   (e) Construction of offsite improvements involving the extension and/or modification of Street and/or Road utility or drainage systems beyond the site.

(4) After approval of the Site Plan, the Applicant shall supply a reproducible mylar for endorsement, along with a copy of the Site Plan in digital format for the DEC records. Proof of recordation and as-built plans may also be required.

3.04: Design Standards

(1) Setback and Frontage Requirements.
   (a) For all lots in all zoning districts, the minimum setbacks of structures from lot lines shall be as follows except as otherwise noted below:

       Front Yard: 25’
       (except in the Innovation and Technology Center District where the min. setback is 15’).
       Side Yard: 10’
       Rear Yard: 25’

   (b) For lots abutting or containing zoning district boundary lines, setbacks shall be increased to 25’ unless adjacent to the Residential I and Residential II zoning districts where the minimum setback shall be 50’.
   (c) The minimum Side Yard and Rear Yard setbacks for accessory buildings in residential districts shall be 5’.
   (d) Environmental Business District. Setbacks shall comply with the requirements of all districts, except the minimum Side Yard and Rear Yard setbacks for lots abutting Walker Road in the town of Shirley shall be 150’ in addition to the public open space buffer parallel to Walker Road.

from the viewshed sensitive receptor and/or along the sides of the building [see 974 CMR 3.08(3) Figure C]. Parking lots shall not be located between the building and the viewshed sensitive receptor except for a maximum of 10% of the total parking spaces constructed which may be located between the principle building and the street that provides the frontage.

(c) Historic Overlay District. The Applicant shall demonstrate the feasibility of shared use of parking lots or the creation of common parking facilities has been investigated. If the investigation demonstrates feasibility, the Applicant shall present a plan to the DEC indicating a parking and access Easement for shared use of parking lots with the abutter(s). The Applicant shall provide evidence that an agreement has been made with the abutter and that the Easement has been recorded at the Registry of Deeds.

(4) Stormwater Management.

(a) General Provisions.

1. Stormwater Management in Site Plan review generally consists of managing stormwater on the site. Stormwater may be retained and recharged on-site, removed by evapotranspiration, or connected to the public drainage system.
2. The DEC encourages Applicants to consider the site's location, abutting and on-site natural resources, and topographic characteristics. The Applicant shall identify all Resource Areas as defined by 974 CMR 4.06(3), the anticipated site uses and intensities, and propose an economic, protective, and efficient stormwater management system that is consistent with the requirements of 974 CMR 4.06 and 4.08. All Applicants shall avoid and/or minimize clearing of mature vegetation.
3. Low Impact Development (LID) Stormwater Management design shall be incorporated into the site plan to allow for the full utilization of the property while maintaining the pre-development characteristics of the site as though it were a "green field" (volume, frequency, peak runoff rate) to the maximum extent feasible. Maximizing the use of pervious areas minimizes stormwater runoff from a site, improves stormwater quality, and increases groundwater recharge. Maintenance of these on-site stormwater management systems must be incorporated into facility operations, and is the responsibility of the landowner. For requirements, design standards, and criteria for LID techniques, refer to 974 CMR 4.08.

4. Drainage systems shall follow the requirements of the Devens Stormwater Pollution Prevention Plan, the Water Resources Protection Report, and the Water Resources Protection By-Law. For requirements, design standards, and criteria for stormwater management systems, refer to 974 CMR 4.08.
5. Regardless of whether site drainage is handled on-site or conveyed to a common or public stormwater management system, on-site stormwater management reuse and recharge systems shall be used for roof runoff (excluding metal roofs), whenever feasible.

(b) Stormwater Management options for Site Plan Submissions: Site generated stormwater shall be managed on-site to meet green field requirements. Conveyance to a common system (operated by the owners of more than one lot), or to the Devens Stormwater System (DSS), managed by MassDevelopment is an option once green field requirements have been met and all reuse and on-site infiltration methods have been exhausted. Stormwater Management options shall include green infrastructure and LID techniques, including but not limited to vegetated swales, rain gardens, bio-filtration landscape islands, rainwater harvesting, and pervious pavement, where feasible, to achieve infiltration/capture/reuse of stormwater runoff on-site. Stormwater treatment trains may include a combination of LID techniques in addition to Conveyance Structures, Detention Basins, Extended Detention Basins, Retention Basins, swales and infiltration structures, water harvesting devices, and proprietary filtration and separation devices.

1. For lots served by the Devens Stormwater System (DSS), the Applicant may connect excess site drainage to the DSS without on-site detention provided that the following standards are achieved:
   a. The Applicant shall obtain written approval from MassDevelopment/Devens Engineering stating that the DSS can accommodate the anticipated peak rate of runoff for the 25-year storm event using the Natural Resources Conservation Service (NRCS) TR-55 method and that the DSS basins have adequate capacity to accommodate the 100-year storm event (TR-20 Methodology).
   b. A Stormwater Pollution Prevention Plan for all disturbed areas, as defined in the Devens Stormwater Pollution Prevention Plan, shall be included.
   c. An adequate system for collecting on-site stormwater has been designed for the premises.

d. There shall be no negative impact from drainage on abutting properties, nor any negative impact to any public or private water supply or designated potential future supply.

2. On-site stormwater management systems for areas without access to the DSS shall include: Conveyance Structures, Detention Basins, Extended Detention Basins, Retention Basins, swales and infiltration structures, and water harvesting devices. There are an increasing number of on-site LID techniques which effectively mimic natural hydrologic conditions. These general categories are not mutually exclusive and shall be combined where appropriate as current Best Management Practices and comply with 974 CMR 4.08.
3. All closed drainage systems shall comply with 974 CMR 4.08(6).
4. Catch basins or other drainage features in loading/unloading and/or fueling areas shall be equipped with post-indicator valves (which are to remain in the closed position) on the outlets for containment in the event of any spills.

(c) Monitoring and Maintenance of Stormwater Facilities. The Applicant shall include a Stormwater Operations and Maintenance Plan in accordance with 974 CMR 4.08(7) as may be applicable. The Site Plan shall specify the construction and post development Maintenance Schedule in detail on the Utility Plan. This will ensure that all parties understand and are aware that a Stormwater Operations and Maintenance Plan exists.

(5) Topographic Alterations.

(a) Topographic alterations shall be minimized, such that buildings, roadways, parking, detention/retention facilities, and all other site improvements shall be located first in previously developed, cleared, disturbed, and/or improved areas of the site, before proposing topographic alterations in previously undisturbed or vegetated areas.

(b) Topographic alterations in undeveloped woodland areas within the setbacks may be approved by the DEC if it determines that the construction of earth berms or slopes will reduce any adverse impacts of development. Tree removal shall be allowed in undeveloped woodland within the setbacks to create a berm or other topographic alteration, so long as alterations are minimized. Replication of trees may be required by the DEC using the same standards established in 974 CMR 3.04 (8) (d) 8.

(c) Topographic alterations may be allowed to provide Improvements to the lot if no other access point can be made safely through already disturbed frontage or if all frontage is undisturbed, such that alterations are to the minimum extent necessary to construct the infrastructure.
(d) Earth removal shall comply with the By-Laws and 974 CMR 4.07.

(6) Site Improvements
(a) All Districts.
1. Sidewalks/Trails: Sidewalks and Trails shall conform to the following requirements:
a. Sidewalks Standards in 974 CMR 2.07(5).
b. In limited circumstances, the DEC may allow sidewalks and trails to be located adjacent to a Street and/or Road only if it is constructed with a vertical curb separating the Street/Road from the Trail.
c. Principle building entries shall have an accessible pedestrian walkway connecting to pedestrian walkways within abutting Rights-of-Way or ways
d. If pedestrian paved areas, such as a plaza, are larger than 20 square feet, pavement shall be cement concrete (pervious preferred) modified with a Solar Reflectance Index (SRI) of 29 or greater. Open grid pavement systems that are at least 50% pervious are a suitable alternative. Refer to 974 CMR 4.08(5) for LID techniques construction specifications.
e. When a portion of the public trail system, as shown on the Devens Main Post Trails report dated July 2001 and any amendments thereto adopted by the DEC, falls within the project site, the trail shall be constructed by the Applicant and an appropriate public access Easement shall be provided for that portion of the trail on the project site. Trails shall be constructed to the specifications in accordance with 974 CMR 3.06 (12) Figure L. or as approved by the DEC.
2. Curbing.
a. Sloped granite curb, vertical granite curb, cement concrete curb and bituminous Cape Cod berm are allowed. Vertical granite curb or cement concrete curb is required at all driveway entrance roundings to the point of rounding tangency. Cast-in-place monolithic, reinforced, air-entrained concrete vertical curb and sidewalks or vertical granite curb is required where sidewalks abut driveways or parking areas.

b. Vertical granite curb, where provided, shall be Type VA4 as specified in Section M9.04.1 of the Massachusetts Highway Department Standard Specifications For Highways and Bridges (MHDSSHB) with a six-inch reveal. Granite transition stones shall be installed when vertical granite curb changes profile to sloped granite curbing or Cape Cod berm or where curbing transitions to areas with no curbs.
c. Vertical cement concrete curb, where provided, shall be as specified in M4.02.00 of the MHDSHB with a six inch reveal.
d. Sloped granite edgestone, where provided, shall be Type SA, SB, or SC as specified in Section M9.04.2 of the MHDSSHB with a six-inch reveal.
e. Catch basins shall have curb inlet stones with transition stones when sloped granite edgestone or Cape Cod berm is used.
f. Cape Cod Berm, where provided, shall be a Modified Bituminous Concrete Berm - Type A (1' width) as specified in Section 106.1.0 of the Construction Standards of the MHDSSHB.
g. Cast-in-place monolithic, reinforced, air-entrained concrete vertical curb and sidewalks shall conform to Section M4.0200 of the MHDSSHB for 4000 psi concrete.
h. Curbing may be eliminated in select areas where there is sufficient protection for the edge of pavement and any drainage and/or safety issues have been adequately addressed to the satisfaction of the DEC.

3. Lighting. Site lighting shall conform to the Industrial Performance Standards (974 CMR 4.04). Lighting posts, fixtures, and housing shall be uniform dark earthtone colors and comply with the following:
   a. Access Road/Parking lighting shall be 0.5-foot candles minimum (maintained), with 30' maximum height posts.
   b. Walkway lighting shall be 0.5 foot candles minimum (maintained), with 15'-18' high posts.
   c. All lighting shall be metal halide (HID), Compact Fluorescent (CFL) and/or Light Emitting Diode (LED).
   d. Bollard lights shall have roof optics with 100% sharp cut-off or shall have, at a minimum, louvered lenses, providing maximum cut-off and be of a single dark earth-toned color. Refer to Figure 1 for examples of acceptable fixtures vs. unacceptable fixtures.
   e. Site lighting plan shall indicate location of proposed/existing trees to demonstrate that there is no

conflict between proposed lights and proposed/existing trees within the site.

f. Commercial and industrial property lights may only be illuminated between 11 p.m. and 7 a.m. if the DEC determines lights are needed to ensure safety for night operations on the premises. This requirement does not apply to residential properties.
g. Lighting plans shall incorporate energy efficiency measures to the maximum extent feasible, including but not limited to LED Lighting, timers, daylight sensors and higher albedo ground surfaces/treatments to reduce number of fixtures required.
h. All light fixtures shall be equipped with appropriate shielding, filters, lenses, or cutoff devices required to eliminate light trespass onto any street or abutting lot or parcel, to eliminate glare perceptible to persons on any street or abutting lot or parcel and to minimize up-lighting.
i. Lighting attached to residential structures shall not exceed the height of the eave.
j. Street and/or Road lighting shall comply with 974 CMR 2.07(6).
k. Outdoor light fixtures used to illuminate an outdoor advertising sign shall be in compliance with 974 CMR 6.03(1)(f) and 974 CMR 4.04.
l. The following exemptions apply to this section:
    i Lighting in swimming pools and other water features.
    ii Exit signs and other illumination required by building codes.
    iii Lighting for stairs and ramps, as required by the building code.
    iv Holiday and temporary lighting (less than thirty days use in any one year).
    v Approved recreational field lighting, with proper controls to minimize glare and light trespass, and automatic shut off no later than 11PM.
    vi The temporary use of low wattage or low voltage lighting for public festivals, celebrations, and the observance of holidays are exempt from regulation except where they create a hazard or nuisance from glare.
m. The following light sources are prohibited:
    i Mercury vapor and quartz lamps.

c. Cast-in-place monolithic, reinforced, air-entrained concrete vertical curb and sidewalks shall conform to section M4.02.00 of the MHDSSHB for 4000 psi concrete.

3. Lighting. Lighting fixtures and poles shall comply with the Report: "*Street Lighting Recommendation for Devens Historic Overlay District*" prepared by Carol R. Johnson and Associates of Boston, MA, dated November 30, 2001. The DEC may allow alternatives within the interior of parking lots and in service areas. Alternative poles shall be a 30' maximum height with arm-type fixture, upward cutoff, and dark in color (post and housing), and shall be a style that is compatible and harmonious with the historic poles and the goals and objectives of the historic district as stated in Article X of the By-Laws.

(7) Utilities.

(a) Sewage Disposal.

1. All sewage generated by site development at Devens shall connect to the Devens public sewer system. The Applicant shall provide evidence that the sewage generated by the proposed development shall be accepted by the Devens Wastewater Treatment Facility.
2. Septic system construction is prohibited. Where a building is served by an existing septic system, the Applicant may continue to use on-site sewage disposal only if two conditions are met:
   a. Connection to the public system is so impractical as to constitute an extreme hardship; and
   b. The upgraded or replaced system meets the 310 CMR 15.00 requirements.

(b) Water Systems. Connection with the Devens water system is required for sanitary and fire suppression purposes. On-site wells may be used for irrigation or process water purposes with the approval of the DEC.

(c) Utility Extensions. The DEC may require Easements to allow utilities be extended to the undeveloped land abutting the site to allow for future connection with the public systems.

(d) Other Utilities. All proposed and existing public and private utility connections, extensions, and services shall be located or relocated underground.

(8) Landscape Treatment.

(a) The existing landscape of Devens is diverse, containing natural wooded environments such as the Nashua River corridor, Mirror Lake, and Robbins Pond, as well as open meadows and ceremonial landscapes such as Rogers Field (parade ground) and the Fort Devens Cemetery. New development shall be respectful and sensitive to the dominant landscape character of the site and Devens as a whole.

(b) The purposes of Landscape Treatment Design Standards in Devens are to:
1. Preserve and enhance the character of the Devens landscape.
2. Provide attractive settings for new development.
3. Preserve the character of the abutting towns of Ayer, Harvard, Shirley, and Lancaster.
4. Preserve and enhance local and regional open space resources such as the Oxbow National Wildlife Refuge.
5. Preserve the integrity of valuable regional historic resources, such as the Devens Historic District and the Fruitlands Museum.
6. Support and encourage the use of sustainable design principles and operating practices that preserve and enhance wildlife habitats, water quality and quantity, and overall health of the natural environment.
7. Encourage the use of indigenous plant material to provide natural habitat and food sources for wildlife and to maintain ecological diversity and minimize potable water usage.
8. Maintain high standards for active and passive recreation, conservation, and other public spaces in Devens and enhance property values for present and future development.

(c) General requirements:
1. All required landscape treatments shall be located entirely within the lot.
2. Native plants shall be used in appropriate locations, such that individual plants are selected for their ability to thrive in or adapt to the particular soil and light conditions they are placed in. (For a list of recommended native plants, see http://www.umassgreeninfo.org/fact_sheets/plant_culture/umass_native_plts.pdf).
3. Under no circumstances, shall any plants be used that are recognized by the horticulture or agricultural industries as invasive, whether native or exotic (non-native). Non-native plants are those species listed as invasive and potentially invasive as per the Invasive Plant Atlas of New England (IPANE) and Massachusetts Invasive Plant Advisory Group.

A listing of these plants can be found at http://eddmaps.org/ipane/ipanespecies/current_inv.htm .

4. All plant material shall meet all American National Standards Institute (ANSI) standards for plant material as set forth in Z60.1: American Standard for Nursery Stock, latest edition. All plant material shall also meet certain standards of quality for form, structure, and health and have a minimum winter hardiness for Zone 5B, as determined by the American Standards for Nursery Stock.
5. Minimum sizes for plant material, unless indicated elsewhere in this Regulation, shall be as follows:
   a. Deciduous shade trees: 3" caliper;
   b. Deciduous ornamental trees: 2" caliper, and;
   c. Evergreen trees: 6' height;
   d. Shrubs. For screening in car parking areas, 3' height; for other screening purposes (dumpsters, loading docks, etc.) 6'; any other purposes, 18";
6. Landscape Treatments shall be laid out in informal drifts rather than formal rows and shall undulate with site topography. Individual clusters of trees or shrub beds are acceptable as long as the tree clusters and/or shrub beds overlap. Linear solutions shall be avoided wherever possible, unless the existing landscape treatment is so arranged.
7. The Applicant may request that the DEC determine that existing vegetation is suitably located, sufficiently visually impervious, and vigorous enough to be substituted for material required by these Regulations.
8. Plant material located within 20' of any road or other paved area shall consist of species recognized by the nursery, horticulture and botanical industries as being tolerant of roadway de-icing salts. (For a sample list of plants recognized as tolerant of roadway de-icing salts, see Appendix A, List II.).
9. In Village Growth I and II, the Innovation & Technology Center, Business/Community Services, and within the Historic District Overlay Zoning Districts, trees may be located in near-urban conditions, near sidewalks or in plazas. In these cases, the Applicant shall propose trees that will tolerate or adapt to those conditions. (For a list of some plants that withstand urban conditions, see Appendix A, List III.).
10. Landscaping shall be maintained in good condition in perpetuity.
11. Disturbed areas intended for natural re-growth shall be, at a minimum, graded, loamed and seeded with a native New

England wildflower and/or conservation seed mix. The planting of native trees, shrubs and other plant varieties is encouraged in these areas.

12. Projects shall reduce the use of potable water for irrigation to the maximum extent feasible by implementing potable water reduction measures that factor in plant species, density and micro-climate as well as irrigation efficiency. Irrigation water shall be derived from detained treated stormwater (rainwater harvesting), or roof drainage, and/or reclaimed greywater (in accordance with 314 CMR 20.00) to the maximum extent feasible. Greywater" is wastewater discharged from domestic sources, including, but not limited to, washing machines, sinks, showers, bath tubs, dishwashers, or other source except toilets, urinals and any drains equipped with garbage grinders. On-site cisterns may be installed to store water for irrigation. The DEC discourages irrigation systems connected to potable water supplies [See also 974 CMR 8.09(11)].

(d) Preservation of Existing Vegetation [See also CMR 3.04(5)]

1. Buildings, parking, loading docks, access roads, and other site elements shall be sited to preserve existing healthy mature vegetation and maintain natural topography to the maximum extent feasible.
2. All trees with a minimum 12" caliper within the setback shall be preserved. Healthy existing wooded areas within setback areas where buildings cannot be constructed shall be preserved to the greatest extent feasible.
3. The Applicant shall not propose topographic alteration within the root zone of any existing tree or wooded area designated as preferably preserved.
4. All work within the root zone of existing trees to be preserved shall be carried out under the direction and supervision of a Certified Arborist. Should there be no feasible alternative, excavation for walkways, curbs, structures, and utilities within the root zones of preserved trees shall be by hand excavation until roots are encountered, bending smaller main roots out of the excavation area, and sawcutting all roots over 1" caliper. All exposed ends of sawcut roots shall be kept moist by covering the exposed ends with wet peat moss and burlap until excavation is backfilled. Existing trees that have had excavation or grade changes within their root zone shall receive crown pruning and root fertilization per the arborist's recommendations.
5. Areas of previously cleared woodlands on site that are not utilized shall be re-planted with native woodland species.

Edges of previously cleared woodlands on site shall be planted with a mix of blueberry, rhododendron, winterberry, bayberry, shrub dogwoods, cranberry bush, spicebush, native viburnums and other hardy shrubs to transition between natural woodland and more formally landscaped portions of a site. Where woodland areas are intended to serve as buffers, such plantings shall be used to fill in voids and rapidly reestablish undergrowth.

6. Building structures, roadways, and paved areas shall be set back at least 12” from the drip-line of wooded areas and trees slated for preservation.
7. Construction activities and site alterations shall not disturb the root zone of the trees designated for preservation. During construction, the Applicant shall install and maintain tree protection fencing, or other protective measures approved by the Director, located 12” beyond the drip-line of the trees to be protected.
8. The Applicant shall be responsible to replace any trees designated to remain, which have been damaged, killed, or removed as a result of construction activities. The DEC requires replacement-in-kind, per caliper inch of deciduous trees and by height for evergreens. Two-inch caliper deciduous trees and 4’ tall evergreens shall be the minimum size used for replacement. For example, if a 24” caliper deciduous tree is damaged or killed during construction, the Applicant shall replace the tree with six 4" caliper trees, or any other combination adding up to 24” caliper. A 36’ tall evergreen, for example, shall be replaced with six 6’ tall evergreens, or any other combination adding up to 36’.
9. Vegetation shall be cleared from Right-of-Ways or way only as needed to accommodate roadway, utilities, and sidewalks. Significant trees (minimum 12" caliper) or woodland vegetation within the Right-of-Way shall be preserved by adjusting the alignment of utilities and sidewalks to avoid the trees. The Applicant shall provide tree wells for any grade change of 6” above or below existing finish grade within 6’ of the trunk of a tree to be preserved. Use of dry laid fieldstone construction for tree wells is encouraged.Soil testing. In order to select plant material that is appropriate for the climate, soil type, light, exposure, and gradient of the site, the Applicant shall have the existing soil tested for both mechanical sieve and chemical analyses by an independent testing laboratory, such as an agricultural extension service or a local agricultural college. The sieve analysis shall be based on the USDA Classification

System. The chemical analysis shall be according to the standards of the Association of Official Analytical Chemists. Should additional soil be required to be used, such as topsoil or planting mix, the new soil shall be tested in the same manner. The testing results shall include recommendations from the testing agency on what amendments, if any, may be needed for the soil to support the proposed plant material in a healthy and vigorous condition and whether the soil can support lawn or woody plants. The Applicant may include these soils tests within the Submission, or shall indicate within the Submission that such soils tests will be performed during the construction process prior to the use of any on-site or imported loam or topsoil. Submission to the DEC of construction phase soil tests and recommendations shall be made a condition of the Permit.

(f) Groundplane treatment.

1. All planted areas and “maintained’ lawns shall pitch at 1:50 minimum slope, to ensure positive drainage on planted areas. Certain alternative groundplane treatments, such as native meadow grasses and wildflowers, may have a minimum slope of 1:100, particularly if the area is used for groundwater recharge or surface water treatment. “Maintained” lawns are those which are cut frequently, once or twice a week during the growing season.
2. All unpaved areas with a gradient between 1:50 and 1:3 shall receive lawn planting as a minimum. Grass shall be provided using either sod, seed, or hydroseed methods, or a combination thereof. The Applicant is encouraged to limit manicured lawn areas to those immediately surrounding buildings, roads and parking lots. In all other areas, the Applicant is encouraged to propose alternative groundplane treatments such as native meadow grasses and wildflowers (For a list of native meadow grasses and wildflowers, see Appendix A, List I.).
3. Any unpaved areas steeper than 1:3 shall be planted with shrubs or groundcover having fibrous root systems.
4. Any unpaved groundplane visible from a Public Way, residences, the Open Space Zoning District, or the principal entrance of buildings on abutting lots and at a gradient of 1:1.5 to 1:1 shall be stabilized using bioengineering methods of erosion control, and 100% plant cover. Riprap or trap rock shall not be used to control erosion in these locations.
5. No slopes shall be steeper than 1:1. Where space is limited, or the grade changes near preserved trees, the Applicant shall provide retaining walls to avoid slopes steeper than 1:1. Retaining walls shall be fieldstone,

fieldstone-veneer and capstones on concrete retaining wall, or flat-face interlocking concrete masonry systems with split-face texture.

6. Due to compacted soils having a higher runoff coefficient, there shall be no construction activities on parts of the site that are to be landscaped or left in their natural state. In areas where this is not feasible, methods to compensate for the compaction must be employed. Landscape areas shall be deep tilled to a depth of at least 12" to facilitate deep water penetration and soil oxygenation. Use of organic soil amendments (compost, sewer biosolids, and forestry by-products, but not topsoil or any mix with soil as an element) is encouraged to improve water drainage, moisture penetration, soil oxygenation, and/or water holding capacity.

(g) Screening

1. Screening shall be a year-round visually impermeable barrier that may be either existing, constructed, or a combination thereof.
   a. Existing screens may consist of natural topographic landforms, rock outcrops, or vegetation that is dense enough to be visually impermeable.
   b. Constructed screens may consist of built screens, such as solid walls or fences, topographic screens, such as berms or landforms, vegetative screens consisting entirely of evergreen material, or a combination thereof.
2. The use of existing vegetation, topography, and natural features to comply with screening requirements is encouraged.
3. Screening is required to soften the visual impact of buildings, vehicle (car, bus, truck, etc.) parking areas, loading docks, trash disposal areas, exterior storage, and other unsightly areas associated with or generated by a particular development as viewed from Public Ways, residential zoning districts in Devens and host communities, the Open Space and Recreation Zoning District ("Open Space Zoning District"), and the principal entrance of buildings on abutting lots. The Director shall determine which Improvements shall be screened prior to or during the Pre-Permitting Conference.
4. Screening may be required along the entire Front Yard setback or only a part of it. Screening may also be required to extend beyond the minimum setback areas or further into the lot, particularly if the building is located beyond the minimum setback or if the lot configuration is such that the visibility into Side Yard or Rear Yard setbacks is unimpaired from the Public Way, residences, the Open Space Zoning

District, and principle entrances of buildings on abutting lots.

5. A minimum of 50% of built screens such as walls or fences that face the Public Way, residences, the Open Space Zoning District, and principal entrances on abutting lots shall be softened with plantings.
6. Vegetative screens shall be visually impermeable year round. Vegetative screens shall be a minimum of two shrubs deep, to a minimum depth of 6' and spaced at such an interval to achieve a visually impermeable screen within three growing seasons (i.e. spacing to be determined by expected rate of growth, not the shrub's mature size). The minimum height of a screen is 3' upon installation in car parking areas and 6' in other locations. A higher height shall be required if the parking area, loading dock, exterior storage, or other unsightly area is at an elevation lower than the Street, residences, the Open Space Zoning District, and principal entrances of buildings on abutting lots. The height of screens can be the result of combining landforms or natural elevation changes with vegetative material. Screens shall not be located so as to impede vehicular or pedestrian traffic.
7. Where Improvements requiring screening such as truck parking, loading, service, disposal, or storage areas are adjacent to such Improvements on the abutting lot, the Applicant shall provide a screen that is 50% visually permeable, with the understanding that the owner of the abutting parcel is responsible for the other 50% of the screen. The DEC encourages shared responsibilities between abutters for providing and maintaining screening.
8. Constructed landforms may be used in conjunction with built or vegetative screens. Constructed landforms shall be organic in shape, of differing shapes and sizes if more than one landform is proposed. The side slopes of constructed landforms shall be loamed and planted with vegetation to minimize erosion. Boulders and rocks may be used within landscape treatments, provided at least one-third of the height of the boulder or rock is below ground.

(h) Landscape Treatment in parking areas

1. Landscape Treatment within parking areas shall provide visual and climatic relief from broad expanses of pavement and shall be designed to channel and define logical areas for pedestrian and vehicular circulation.
2. The Applicant shall provide shade trees around the perimeter of all parking areas at a minimum ratio of one (1) tree per 25 lineal feet of parking lot perimeter. In portions of

parking areas where screens are required, the Applicant shall provide shade trees along the perimeter at a minimum ratio of 1 tree per 50 lineal feet of parking lot perimeter in addition to the required screen. Trees shall appear informally arranged, rather than set in straight evenly spaced rows, unless existing trees or major site elements suggest a formal arrangement. Informally arranged trees may be clustered or grouped, if desired, as long as clusters/groups are not more than 75' apart.

3. Internal parking area plantings are required. Exclusive of perimeter screen planting, internal parking lot landscape areas shall contain one deciduous shade tree for every 20 parking spaces. Trees shall be distributed throughout the parking lot as evenly as possible, although more than one tree may be located on a single island. Trees shall be set back at least 5' minimum from the face of the curb. Tree placement and parking lot lighting shall not conflict. Salt-tolerant shrubs shall be planted along divider islands, preferably native species clustered in groups of 5 or 7, at a rate of 1 shrub for each 10' of divider island length. Interior parking area plantings may be waived in truck parking areas if interior areas are screened from Streets, the principal entrance of any abutting building, the Open Space and Recreation zoning district, or residential zoning district with a year-round visually impervious screen at least 6' tall at installation and perimeter plantings are provided.
4. Parking area terminal, intermediate, and divider islands shall contain no more than 25% impervious surfaces. The remaining 75% shall be landscaped with grass or other groundcover suitable to the Director. Shrubs planted in islands shall not exceed 4' in height where they might impede vehicular or pedestrian circulation.

(i) Viewshed Overlay Districts: The Viewshed Overlay District protects scenic vistas from the top of Prospect Hill and the Fruitland Museum. Affected areas in Devens are shown on Figure H in Appendix B. [974 CMR 3.06(8)]. The following apply to all projects within the Viewshed Overlay District:

1. To the maximum extent feasible, buildings and all topographic alterations in the viewshed shall be located within previously disturbed areas (see 974 CMR 3.06(6) Figure F).
2. Where buildings encroach on undisturbed wooded areas, the DEC may determine that such encroachment would have a significant adverse effect on the viewshed. To mitigate this adverse effect, the DEC may require that additional trees of at least 4" caliper or clusters of 3" caliper

minimum to be planted. The DEC shall determine the spacing, density, size, and location of trees needed to soften the visual impact of the new construction.

3. If substantial tree canopies do not exist between Prospect Hill and the building, vegetative screen on the side(s) of the building directly facing Prospect Hill may also be required (see 974 CMR 3.06(6) Figure F). This screen shall be located no further away from the building than a distance equal to the building height. Required screens shall extend the full length of the building facing Prospect Hill. Additional screening requirements:
   a. Landscape Screen on Level Terrain in Viewshed Overlay Districts. If a landscaped screen is required on land at approximately the same elevation as the finished grade of the building, deciduous trees of 4" minimum caliper and evergreen trees of 10' minimum height (with at least one evergreen tree for every three deciduous trees) shall be planted at a density and location specified by the DEC (see 974 CMR 3.06(7) Figure G1).
   b. Landscape Screen on Natural or Artificial Berm in Viewshed Overlay Districts. Where a screen is located on land higher than the finished grade of the building, the required deciduous tree caliper can be reduced by ½" and evergreen tree height can be reduced by 2' for every 3' of elevation difference compared to the finished grade of the building, to a minimum size of 3" caliper for deciduous trees and 6' height for evergreen trees. The number and location of trees planted shall be specified by the DEC.
4. Buildings within the Viewshed Overlay District shall not have reflective metal flashing, mechanical enclosures, window frames or treatments, doors, roofing material, or building trim and all metal surfaces shall be finished with a dark, non-reflective finish. Rooftops shall not be illuminated. Signs shall be located below new or existing tree canopies.
5. Vegetated Rooftops and Vegetated Walls. To the maximum extent feasible buildings within the Viewshed Overlay District that are visible from Prospect Hill at the Sears Estate and/or the Fruitland's Museum and/or residential uses outside of Devens shall have:
   a. Vegetated roofs that comply with the DEC's Vegetative Roof Policy. A vegetated roof is a roof that is covered with vegetation and a growing medium, planted over a waterproofing membrane. It uses a root repellant

system, a drainage and filter layer, and a growing medium of at least 4" and plants.

b. Vegetated walls on the sides of the building facing and visible from Prospect Hill at the Sears Estate and/or the Fruitlands Museum and/or residential uses outside Devens. A vegetated wall is a wall, either free-standing or part of a building that is partially or completely covered with vegetation and, in some cases, soil or an inorganic growing medium. There are two main categories of vegetated walls: vegetated façades and living walls. Vegetated façades are made up of climbing plants either growing directly on a wall or specially designed supporting structures. The plant shoot system grows up the side of the building while being rooted to the ground. In a living wall the modular panels are often made of stainless steel containers, geotextiles, irrigation systems, a growing medium and vegetation.

6. Landscaping plans for projects located in the Viewshed Overlay District shall show the design and location of vegetated roofs and walls.

(j) Internal View Corridors (As a Site Design Consideration). Within planned developments, such as Innovative Developments (By-Laws Article III, Section F. and 974 CMR 5.02), campus-like multiple buildings on one or more lots, or urbanized or commercial centers, the internal roadway system shall be landscaped and screened as though the drives are Streets, unless the DEC determines an alternative better suits the development layout and the character of the area. Required screens between adjacent uses within a planned development may be eliminated or reduced if the DEC finds that the screening on the lot effectively blocks views of parking lots, loading areas, refuse collection facilities, and other potentially unattractive areas from adjacent Streets and within the planned development. The Applicant shall prepare a landscape treatment plan for the entire planned development area, indicating areas to be screened, materials, locations and types of lighting fixtures, location and plant materials for parking lot buffers, location of signs, and other improvements as determined by the Director.

(k) Street Trees are shade trees located along a Road and/or Street.

1. Where existing street trees are more than 50' apart on average or do not exist along a Street or Road, the Applicant shall plant street trees. Street trees shall be placed in a linear fashion along the Right-of-Way or way boundary, at a maximum spacing of 50' on center on all

collectors and boulevards. The maximum spacing for all other Streets and Roads shall be 40' on center. Where the character of the site is predominantly wooded or pastoral, the Applicant may cluster trees informally along the lot line, with a maximum of 75' between clusters of three or more trees.

2. Street trees shall be selected from 3.06(5) List V. The Applicant may request the DEC allow other species to be utilized.

(l) Landscape Treatment of Building Facades visible from Roads and/or Streets.

1. The perimeter of all commercial and industrial buildings visible from a Road or Street, the principal entrance of adjacent or abutting buildings or from the Residential or Open Space Zoning Districts shall have continuous landscape treatment in the form of shade trees, ornamental trees, evergreen trees, shrubs, or a combination thereof within 50' from the face of the building. Landscape treatment shall consist of a minimum of one (1) shade tree per 50 lineal feet of building façade, or three (3) ornamental/evergreen trees per 50 lineal feet of building façade. Trees may be clustered or grouped, if desired. All trees shall be arranged in staggered, triangulated, or informal drifts, unless available space does not permit, or unless existing vegetation is geometrically arranged or unless such an arrangement is blocking required passive and/or active solar gain. Applicant may request a waiver to propose geometrically-based planting arrangements if the proposed building and site plan design strongly merits a more formal arrangement. Foundation planting is not encouraged, but may be allowed at or near primary and secondary building entries (not maintenance, service, or emergency egress entries). Where allowed, the landscaped foundation bed shall be a minimum depth of 20' in the Innovation & Technology Business, Innovation & Technology Center, Business/Community Services, Village Growth I & II, and Special Use I & II Zoning Districts, and a minimum of 10' depth in all other Districts. The landscaped bed shall consist of shrubs and groundcover to its full horizontal depth, with a minimum of 2 rows of shrubs.
2. The Landscape Treatment adjacent to buildings may be reduced or waived by the DEC in cases where it is impractical to provide the specified depth of landscape area due to the size, shape, or other characteristics of the lot; however, in no case shall any parking space or vehicular lane be located closer than 10' from the building.

3. Required landscape beds along building foundations may be substituted with remote (i.e., not abutting the façade) beds of ornamental or evergreen tree plantings.

(m) Landscape Treatment for Residential Projects.

1. In addition to the required street trees, all residential projects shall include a minimum of one 3" caliper deciduous tree and one 6'tall coniferous tree (native species) per 5,000 square feet of lot area.
2. For proposed Parks and/or Open Spaces without substantial natural/native vegetation, the DEC may require additional plantings for shade, heat island mitigation, and/or aesthetics.

(n) Maintenance.

1. The owners of any lot shall be responsible for the maintenance of all landscaped open space, natural screens, and constructed screens within the lot. Landscape Treatment shall be maintained in good condition such that plantings shall be vigorous and in good health at all times and that the parcel shall present a healthy, neat, and orderly appearance, free from refuse and debris.
2. The DEC may require a landscape maintenance and water management plan. The maintenance plan shall include but not be limited to the following:
   a. Integrated Turf Management/Integrated Pest Management Plan: mowing schedule, weed control, pest control, soil pH management, fertilizer plan, aeration/dethatching schedule, repair/replacement plan. Such a plan shall include steps for managing turf pests or diseases while minimizing inorganic and over-application of fertilizer and pesticide use and the corresponding negative impacts on the environment. Refer to the Integrated Pest Management Tools listed on the Landscape Nursery and Urban Forestry - UMASS Extension website at http://www.umassgreeninfo.org/
   b. Shrub and Groundcover Management: mulch schedule, weed control, pruning where needed for visibility, preventative pest/disease management, repair/replacement plan. Mulch must be applied regularly to, and maintained in all, planting areas to assist soils in retaining moisture, reducing weed growth, and minimizing erosion. Mulches include organic materials such as wood chips, compost and shredded bark and inert organic materials such as decomposed lava rock, coble, and gravel. If weed barrier mats are used, the use of inert organic mulches is

recommended. Non-pervious materials, such as plastic sheeting, are not recommended for use in any area of the landscape because of down-slope erosion, potential soil contamination from herbicide washing and increased runoff coefficients. Mulches shall be applied to the following depths: 3" over bare soil, and 2" where plant materials will cover. Mulches for stormwater management areas shall be heavier and not of a type that will float away.

c. Tree Management: mulch schedule, weed control, deadwood removal, pruning schedule (particularly for trees adjacent to walk or roads), fertilizing schedule, preventative pest/disease management, repair or replacement plan.

d. Water Systems Management: Water source, system description, spring start-up, fall close-out, system testing schedule, repair/replacement plan. The Applicant may install a permanent water supply system consisting of a sprinkler system and/or hose bibs placed at appropriate locations and intervals. Whenever possible, irrigation water shall be derived from sources other than the Devens water system, including reclaimed greywater, detained treated stormwater, roof drainage, or water from on-site wells. "On-site cisterns may be installed to store water for irrigation.

e. Rodent control: design preventative measures, operational preventative measures, monitoring, schedule, remediative action plan.

f. Seasonal Maintenance: Spring clean-up plan, fall clean-up plan, disposal plans for leaves and plant debris, winter plowing plan, winter deicing plan.

g. All applications shall identify invasive plant species on the parcel and include an invasive plant species removal, treatment, monitoring program as part of the long-term maintenance requirements for the site. Species listed as invasive and potentially invasive as per the Invasive Plant Atlas of New England (IPANE) and Massachusetts Invasive Plant Advisory Group are prohibited from being planted and shall be included as part of any invasive plant species removal, treatment and monitoring program. IPANE website, including invasive species management resources can be found at http://eddmaps.org/ipane/ipanespecies/current_inv.htm. Invasive Species Management Plans shall include the following:

i. Integrated pest management (IPM) strategies;
ii. Procedure for identifying and monitoring for additional invasive species that may colonize the site and new species as recognized by IPANE;
iii. Initial treatment, follow-up treatments, long-term control including monitoring, and methods to dispose of invasive plant materials to prevent spread

3.05 Innovative Development

Innovative and Planned Use Development - The By-Laws (Article III, Section F.) require the Commission adopt Regulations that encourage the use of "innovative development strategies, including, but not limited to, clustered development, condominium development, and planned unit development methods." Refer to 974 CMR 5.02.

3.06: Steep Slope Protection

(1) Purpose. Development on or adjacent to unique ridgelines, slopes and plateaus can have an adverse impact on:
(a) Water quality by causing erosion and sedimentation and changing patterns of stormwater runoff;
(b) Wildlife habitat and corridors; and
(c) Slope stability.
These adverse impacts can be avoided by restricting development and mitigating its impacts.

(2) Applicability. The General Requirements of this subsection 974 CMR 3.06 apply to Slope Resource Areas (SRAs) shown on the Devens Slope Resource Area Map [see Appendix B Figures (13) Figure M and SRA buffer areas (as described below)] and development outside these areas that may impact them.

(3) General Requirements
(a) There shall be no Site Disturbance in SRAs and the 15' No Disturbance Area around them, except that the following are permitted:
1. Construction of low-impact hiking/walking trails identified in the 2001 Devens Main Post Trails Plan;
2. Removal of the minimum number of trees necessary to ensure adequate site lines but in no instance shall roots be removed unless the DEC approves a vegetation and soil management plan designed to maintain slope and soil stability; and
3. Removal of vegetation and re-planting of native plant species may be allowed according to a vegetation and soil management plan approved by the DEC if the area has

been previously disturbed by recent human activity or is infested by noxious weeds and/or invasive plant species.

(b) There shall be no Site Disturbance within the 35' Buffer Area beyond the 15' No Disturbance Area, unless the DEC makes a finding that the proposed activity will have no adverse impacts on the structure and stability of the SRA and 15' No Disturbance Area. To support such a Finding, the Applicant shall be required to submit a geotechnical report, prepared by a professional geotechnical engineer, that demonstrates the proposed activity within the 35' Buffer will have no adverse impacts on the structure and stability of the SRA. Any development authorized within the 35' Buffer Area shall preserve existing vegetation to the maximum extent feasible .

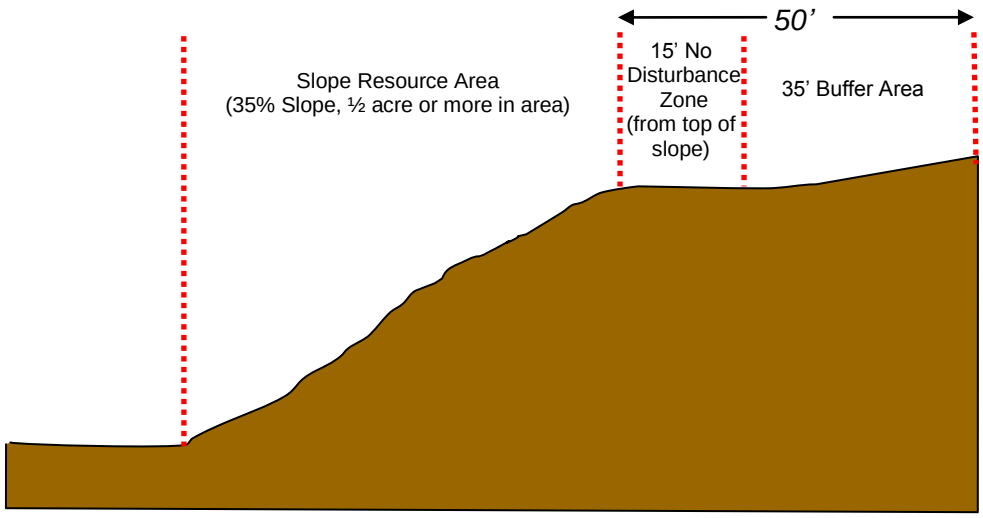
(c) The Applicant shall demonstrate to the satisfaction of the DEC that (i) additional stormwater runoff from the proposed development is not directed toward the SRA or SRA Buffer Areas and that (ii) there are adequate measures in place to ensure there is no increase in the rate of stormwater runoff directed toward the SRA or SRA Buffer Areas.

(4) Definitions.

The following definitions pertain to this subsection 974 CMR 3.06 only:

Site Disturbance**:** Any activity which removes the vegetative cover and/or soils from the land surface.

Slope Resource Area (SRAs)**:** Naturally formed, undisturbed slopes with a contiguous areas of a ½ acre or more. These areas are identified on the Devens Slope Resource Area Map in 974 CMR 3.06 Appendix B Figures (13) Figure M. Such slopes are generally in excess of 35%, with mature vegetative cover and in close proximity to sensitive resource areas and/or unique geological formations.



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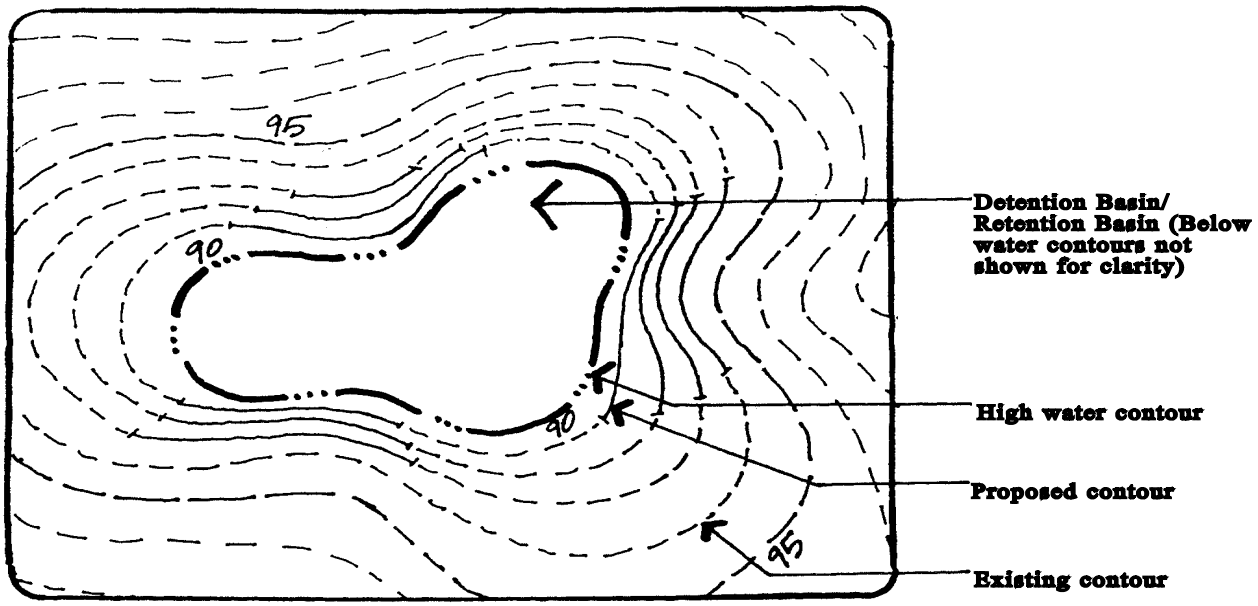
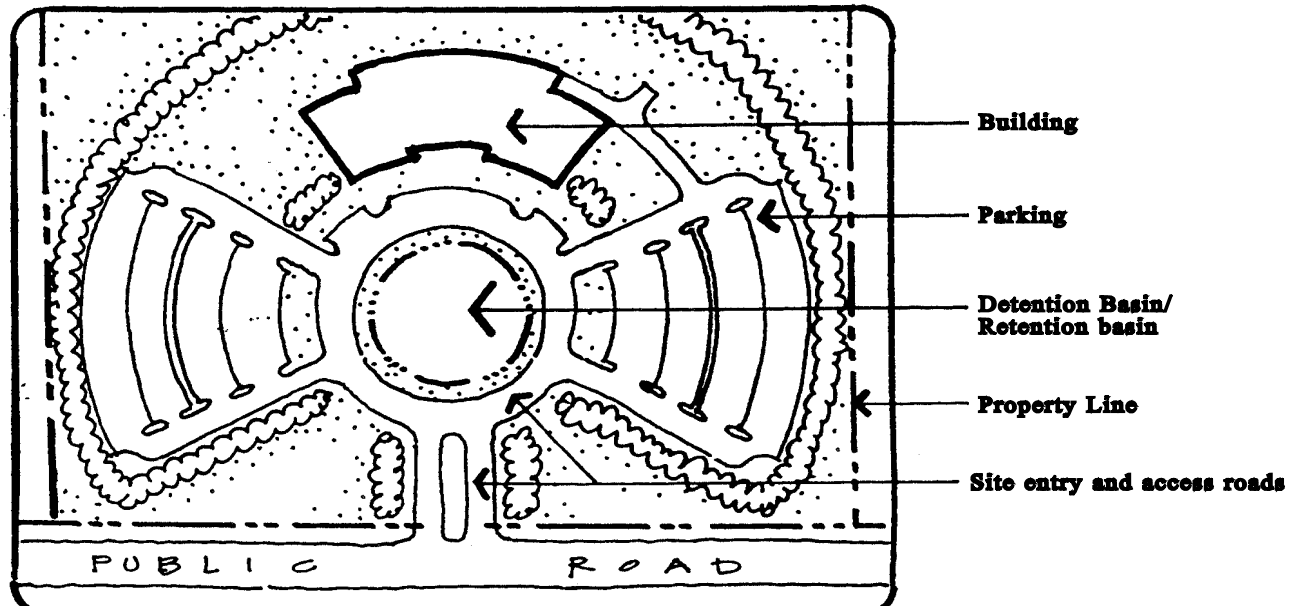
(4) Figure D: Favorable Detention/Retention Pond Layout.

(a) Informal/naturalistic: basin layout complements natural topography



(b) Formal: Basin layout complements overall site design concept



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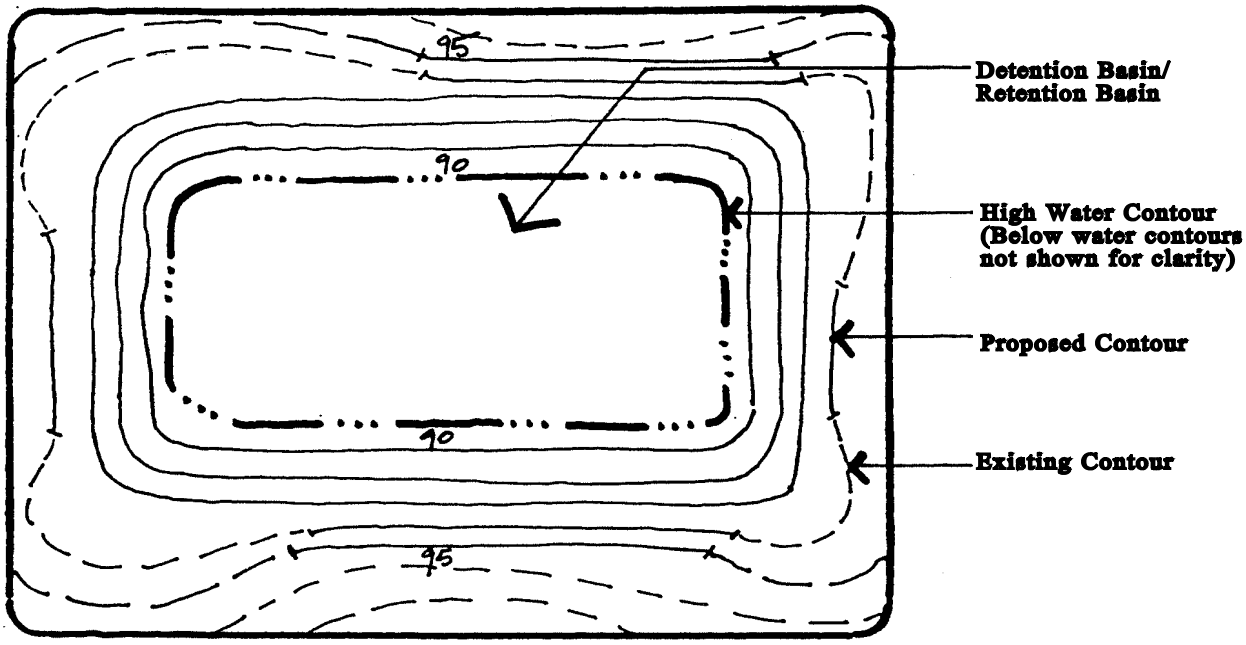
(5) Figure E: Unfavorable Detention/Retention Pond Layout.



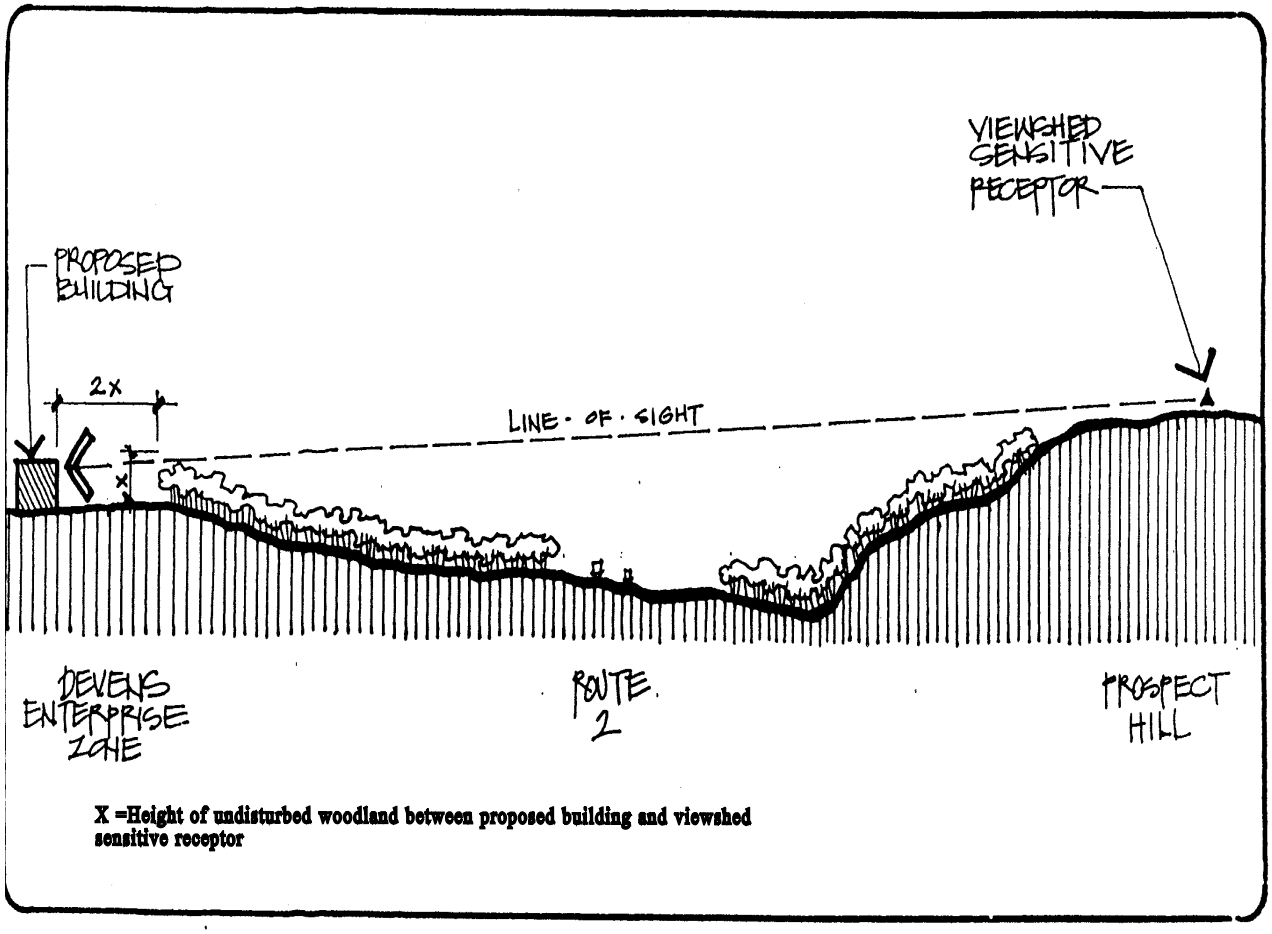
Rigid Geometry of Basin Layout Does Not Complement Natural Topography of Site.

3.08: continued

(6) Figure F: Siting Buildings Within The Viewshed Overlay District. The intent is to utilize existing undeveloped woodland and/or natural topographic features to help visually screen the building from the viewshed sensitive receptor. The following criteria apply:

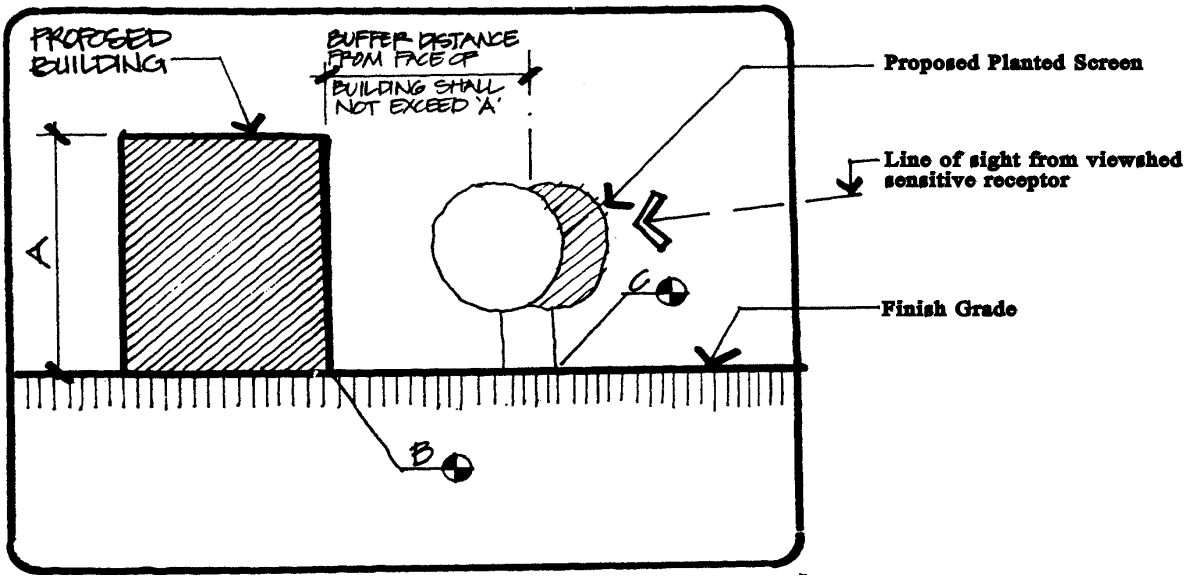
(a) Where 'X' is equal to or greater than the height of the proposed building, a landscaped visual screen will be required on the side(s) of the building directly facing the sensitive receptor if the building is 2X or greater from the woodland edge. See 974 CMR 3.06(7) Figure G for landscape screen design criteria.

(b) Where 'X' is less than the height of the proposed building, (or no natural vegetative or topographic screen exists), a landscaped visual screen will be required. See 974 CMR 3.06(7) Figure G.

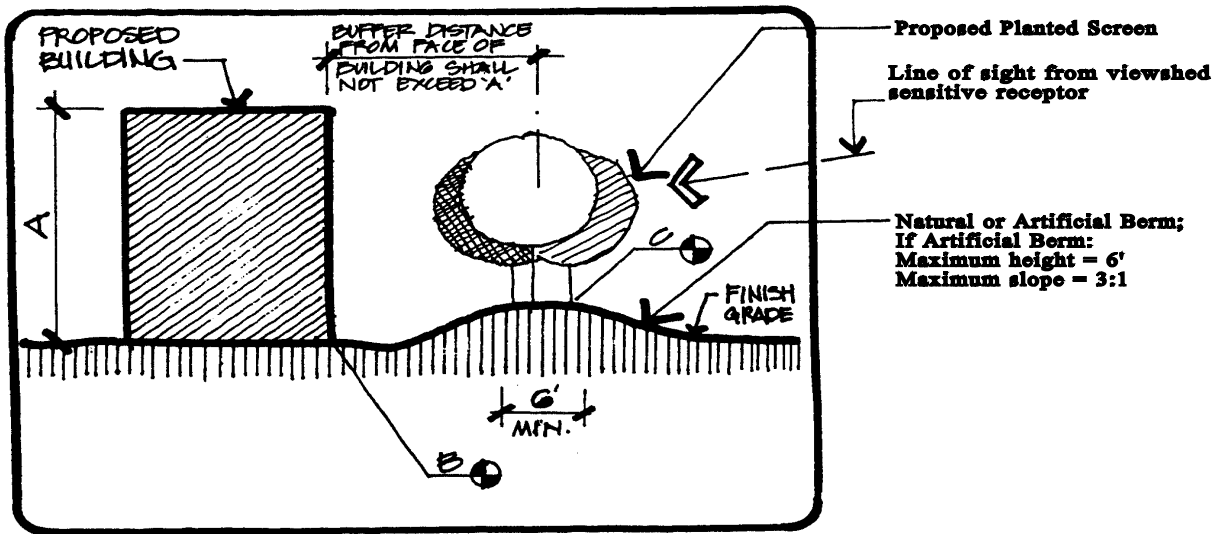


3.08: (7) Figure G: Landscaped Visual Screen Within Viewshed Overlay District.

(a) Where elevation is equal to Elevation C, trees shall be Min. 4" cal. with mature heights equal to or greater than A. Screen shall contain 25% of evergreen trees at 10' height min.



(b) Where elevation B is lower than elevation C, tree caliper may be reduced by ½" or evergreen height can be reduced by 2.0 for every 3' of elevation to a min. Size of 3' cal. for deciduous trees, and 6' ht. for evergreen trees. Where elevation B is higher than elevation C, deciduous tree sizes shall be increased by ½" and evergreen tree height increased by 2" for every 2' of elevation difference.



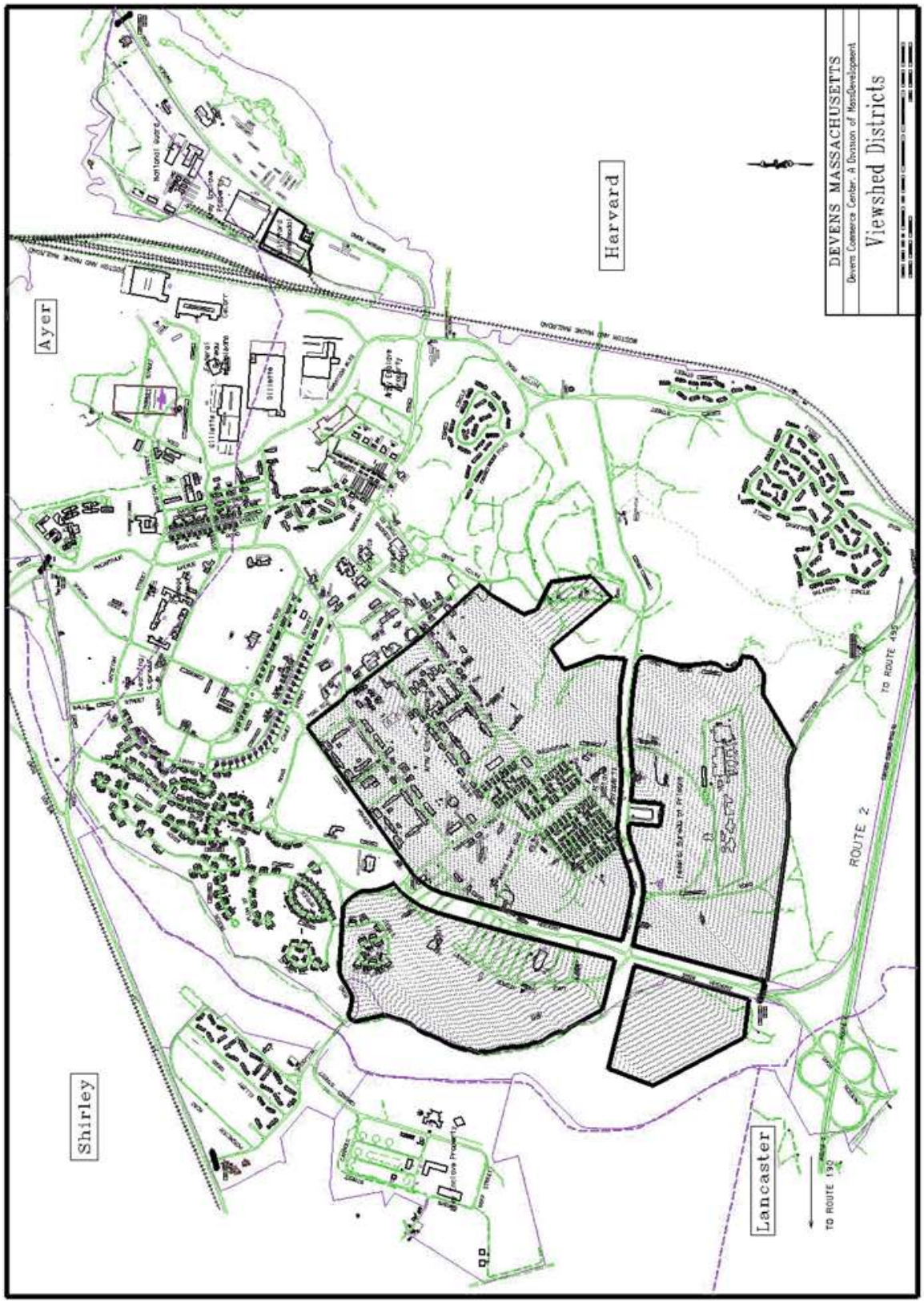
Note a. A = Height of building. B = Finish grade at face(s) of building directly facing viewshed sensitive receptor. C = Elevation at base of tree where trunk meets finish grade.

Note b. The requirements in this figure may be waived by the DEC if sufficient *existing* vegetative or topographic screening can be utilized to the same effect.

Note c. Tree buffer shall extend full length of building facing sensitive receptor. Trees shall be spaced 20' on center min. Trees shall be in two staggered rows with 5' min. offset.

3.08: continued

(8) Figure H: Viewshed Overlay District



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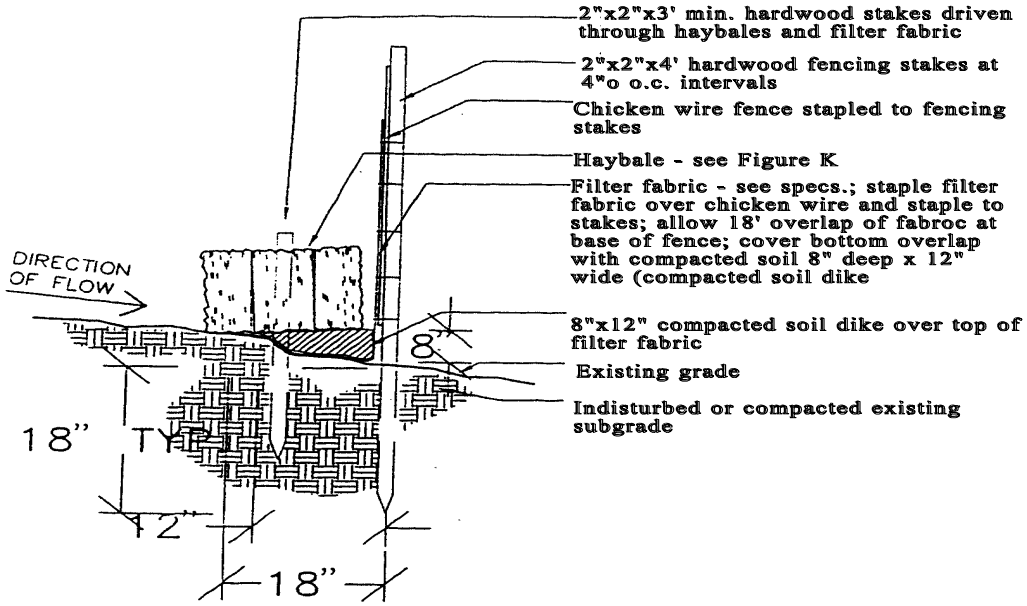
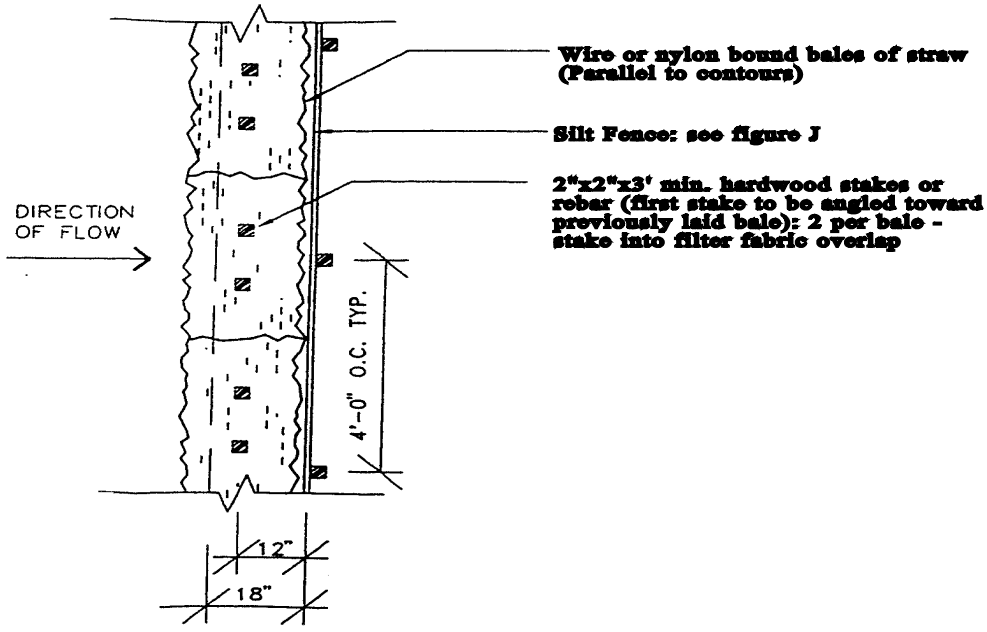
(10) Figure J: Silt Fence.

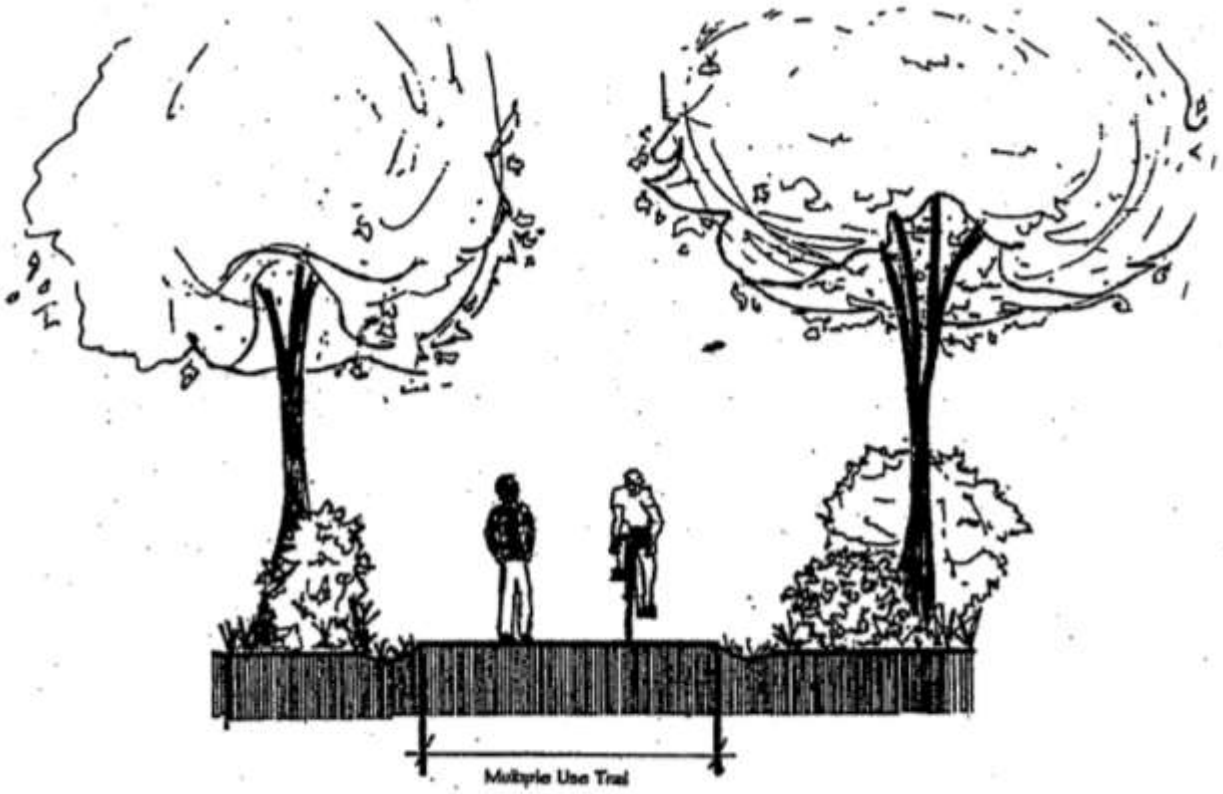


(11) Figure K: Haybale Dike.



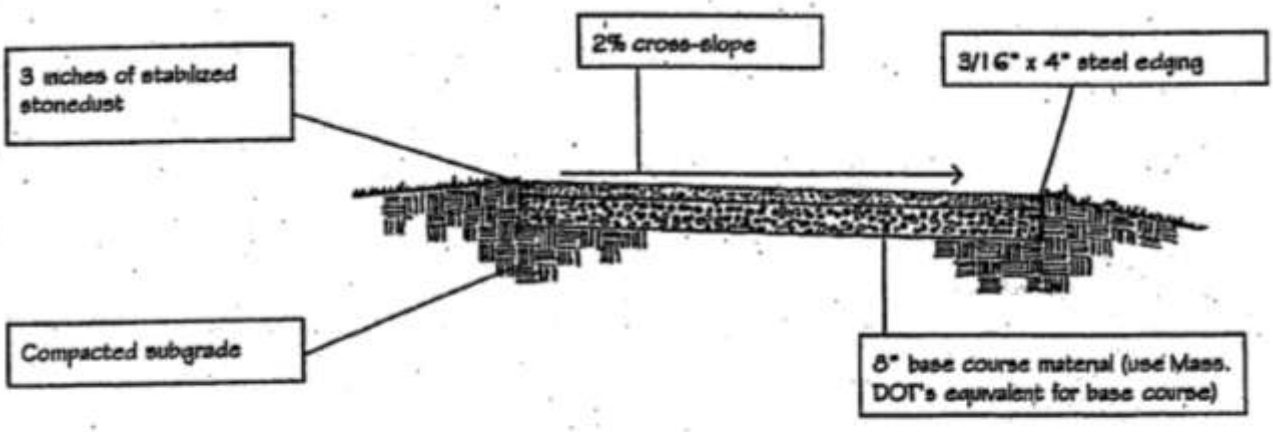
Note a. Bales shall be placed in a row with ends tightly abutting the adjacent bales.
Note b. Bales shall be securely anchored in place by 2"x2" hardwood stakes or rebar driven through the bales to a depth of 1'6" min. below grade; the first stake in each bale shall be angled to force bales together.
Note c. Inspection shall be frequent and repair or replacement will be made promptly as needed throughout duration of contract.

3.08: Continued: (12) Figure L: Trail Detail



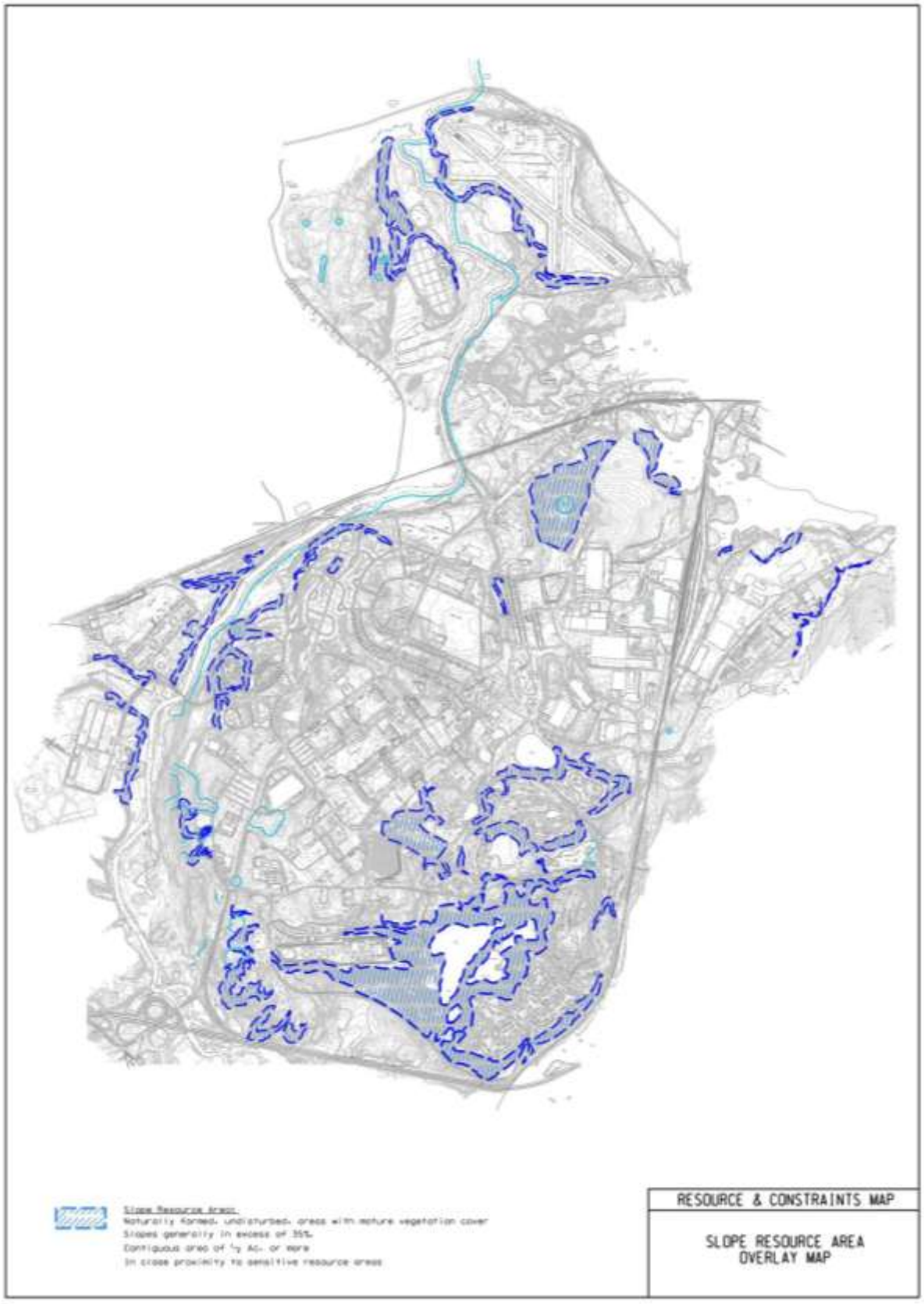
Multiple Use Off-Road Trail

Trails shall be designed primarily for pedestrian, bicycle, and equestrian use, as appropriate. The DEC shall determine the finished width.



Typical Trail Section

3.08: Continued: (13) Figure M: Devens Slope Resource Area Map



Chapter 4 **INDUSTRIAL PERFORMANCE STANDARDS AND GENERAL REGULATIONS**

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4.01: Industrial Performance Standards

(1) The Devens Enterprise Commission (DEC) was created and empowered by St. 1993, c. 498, § 11, to carry out the purpose and intent of the Devens Reuse Plan, By-Laws, and subsequent development regulations pursuant thereto. The Plan and By-Laws were passed by three simultaneous Town Meetings in the municipalities of Ayer, Harvard and Shirley on December 7, 1994. In achieving its specific mission as the regulatory and permitting authority within Devens, and in generally protecting the health, safety and welfare, the Commission may legitimately exercise its right to protect the public, as well as other occupants and users within Devens, from nuisance conditions.

(2) The intent of 974 CMR 4.00 is to preclude or significantly mitigate nuisance conditions by means of

(a) providing a complaint mechanism for parties impacted by potential violations and

(b) in certain circumstances where the potential impacts are likely to impact receptors beyond the perimeter of Devens, providing review criteria for the consideration of permit applications requiring site plan approval.

(3) It is recognized that occupants of Devens could generate conditions from their operational activities, which could cause nuisance to abutters within Devens (“Internal Receptors”) or to community residents from the towns of Ayer, Harvard and Shirley (“External Receptors”). There are also unique sensitive receptors such as the Harvard University-Smithsonian Observatory and the Harvard University Radio Telescope on the same site on Oak Hill in the Town of Harvard (“Special External Receptors”). The subject areas of

4.06 Wetlands Protection.

(1) DEC Powers: Under the Act, the DEC has full powers to enforce the Massachusetts Wetlands Protection Act, (M.G.L. c. 131) and the Regulations pursuant thereto, (310 CMR 10.00 et. seq.).

(2) Purpose: To protect the wetlands and water resources in Devens and adjoining land areas by controlling activities likely to have a significant or cumulative effect on wetland functional values, including but not limited to:
(a) public and private water supply protection
(b) groundwater supply protection
(c) flood control
(d) storm damage prevention
(e) pollution prevention
(f) fisheries protection
(g) wildlife habitat protection
(h) erosion prevention and sedimentation control

(3) "Resource areas" include any:
(a) freshwater wetlands,
(b) marshes,
(c) wet meadows,
(d) bogs,
(e) swamps,
(f) vernal pool habitat
(g) banks
(h) reservoirs
(i) lakes
(j) ponds of any size
(k) rivers, streams, and creeks
(l) lands under water bodies, and
(m) lands subject to flooding or inundation by ground or surface water (collectively protected as "Resource Areas").

(4) When Permits are Required: No person shall remove, fill, dredge, build upon, degrade, discharge into, or otherwise alter Resource Areas except as permitted by the DEC or as exempted by this section. Permits are required when activities are conducted within Resource Areas or within one hundred (100) feet of Resource Areas. Lands within one hundred (100) feet of Resource Areas are presumed important (By-Laws, Article XII Section C.1) to the protection of Resource Areas because activities undertaken in close proximity to Resource Areas have a high likelihood of adverse impact on the Resource.

(a) The By-Laws do not permit any alteration of natural vegetation or substrate within twenty-five (25) feet of a Resource Area or any building within fifty (50) feet of a Resource Area except that the construction of recreational facilities (bikeways, trails, docks, etc.), roads, streets, rail sidings, aboveground or underground public

utilities and infrastructure, detention basins or drainage structures, measures undertaken for the remediation of contaminated soils or groundwater, or removal of solid waste is allowed within these setbacks. Any exceptions shall implement all controls necessary to minimize adverse impacts to Resource Areas.

(5) When Permits are not Required:

(a). Maintaining, repairing, or replacing an existing and lawfully located structure or facility used in the service of the public to provide electric, gas, water, telephone, or telecommunication services, provided that written notice has been given to the DEC prior to the commencement of work and there are adequate (as determined by the DEC) measures to protect the Resource Areas during the maintenance, repair, or replacement activities. This exemption does not apply to substantial changes to or enlargement of such structures or facilities. An Applicant claiming that work to remove, fill, dredge or alter a Resource Area does not require the filing of a Notice of Intent has the burden of establishing that the work is not subject to Regulation under M.G.L. c. 131, s.40. In such cases, the Applicant may be required to file a Request for Determination of Applicability with the DEC.

(b) Emergency projects necessary for the protection of the health and safety of the public as per 310 CMR 10.06(1), provided that:

a. The work is performed or supervised by Mass Development

b. Notice, oral or written, has been given to the DEC prior to or within 24 hours of the commencement of work. Such notice shall specify why the project is necessary for the protection of public health and safety.

c. The Director certifies the work as an emergency project. The certification shall include a description of the work which is to be allowed.

d. The work is performed only for the time and place certified by the Director for limited purposes to abate the emergency, and

e. A permit application shall be filed with the DEC within 21 days of commencement of an emergency unless the project has been completed by this time.

(6) <u>Applications for Permits</u>

(a) Applications to perform activities affecting Resource Areas (Notices of Intent) and decisions to allow such activities (Orders of Conditions) are subject to Level Two review. The issuance of a Certificate of Compliance is a Level One permit.

(b) Applications shall include a description of proposed activities and their effects on Resource Areas. No activity shall commence without receiving and complying with a permit issued pursuant to this Section 4.06.

(c) Applicants seeking a Request for Determination (RFD) as to whether a Notice of Intent (NOI) is required shall submit their application simultaneously to the DEC and the DEP Central Regional Office. The Director shall review the RFD and issue a Determination within twenty-one (21) days of the submission of the application. A positive Determination requires an Applicant to file an NOI. If the application for an RFD is incomplete, a positive Determination shall be rendered. Any Determination by the DEC Director is valid only upon ratification by the DEC at a public meeting. The DEC may ratify, modify or disapprove the Director's decision. A negative Determination shall be valid for three years, provided the project is not changed within that period.

(d) An NOI is required to fill, dredge, or alter any wetlands or land within one hundred feet of a wetlands or water body. An NOI shall include:

1. Owners' and Applicants' names, date of application, scale
2. North arrow
3. Size of total lot, size of altered or impacted areas, calculations based on accurate measurements and certified by a Professional Engineer
4. Assessors map and lot (if available) and a list of abutters, certified if possible
5. Stamp and seal of engineer and other professionals preparing the plan
6. Existing contours at 2 foot intervals (or as specified by the Director)
7. Proposed contours and amount of fill or material removed
8. Location and specifications of any retention structures or other improvements
9. Existing drainage patterns and proposed alterations
10. Boundaries of all waterbodies, wetlands, and buffer areas (buffers as defined in the By-Laws, Article XII, Section C.1)
11. 100-year floodplain
12. Top and toe of bank
13. Identification of indigenous upland and wetland vegetation
14. Limit of work ("construction envelope")
15. Erosion and sedimentation plan showing the details and location of all temporary erosion control
16. All existing and proposed below-ground alterations and structures, including drainage structures and systems, septic systems, wells, storage tanks, etc.
17. Distance of leaching facilities to wetlands, water course, and waterbodies
18. Drainage easements and ways
19. Wetland Replication plans (if replication is required) including, but not be limited to, design, construction and monitoring consistent with the Massachusetts DEP Wetland Replication Guidelines, March 2002, as amended

20. Required forms and fees,
21. Details on impacts on habitats of state-listed species (if any).
22. A written request to extend the time in which the DEC must render a decision (to accommodate the DEC required thirty-day town comment period) shall be filed with the application.
23. A certified list of all abutters and property owners within three hundred (300) feet of the boundaries of the site upon which the work is to be performed.
24. Any other material specified by the Director

(e) Public hearings will be advertised, noticed, and held as required by the By-Laws and 974 CMR 1.04. The Applicant shall stake or flag the edge of wetlands on the project site at least five days prior to the hearing. The DEC, after public hearing, shall determine whether the impacts on the area on which the proposed work is to be done are significant to public or private water supply, to the groundwater supply, to flood control, to storm damage prevention, to prevention of pollution, to the protection of wildlife habitat, to erosion and sedimentation control or to the protection of fisheries, and shall by written order within twenty-one days of such hearing impose such conditions as will contribute to the protection of the Resources.

(f.) All work shall be done in accordance with the orders issued by the DEC. No work may commence until the final order and plans have been recorded in the Registry of Deeds and proof of such recordation has been submitted to the DEC and a sign identifying the project with the MADEP file number has been posted on site in a location visible from the nearest public way.

(g.) The DEC may require that the performance and observance of the conditions imposed be secured wholly or in part by either:

1. A proper bond or deposit of money or other instrument acceptable to the Director as specified in 974 CMR 1.13.
2. A conservation restriction, easement, or other covenant enforceable in a court of law, executed and duly recorded by the owner of record, running with the land to the benefit of the DEC or a non-profit organization, the principal purpose of which is the conservation of open space.

4.07 Earth Removal

(1) Removal of earth shall be performed only incidentally to an approved site plan, approved subdivision plan, or other approval from the DEC.

(2) Prior to commencement of excavation, Applicant shall demonstrate, to the satisfaction of DEC staff, compliance with Devens Soil Management Policy and Devens UXO Protocol and Procedures, revised August 2006 as may be amended from time to time.

(3) Material associated with the lawful construction of a building, structure, street or driveway, way, sidewalk, path, utilities, or other appurtenance incidental to any building, structure or street shall not be removed from Devens without the prior approval of the DEC. Any Applicant requesting removal of material from Devens shall provide the following information to the DEC: the proposed volume of material being removed, hours and days of removal operation, duration, volume of trucks, transportation routes, dust control, sedimentation and erosion controls, and restoration measures to be taken, and any additional information the DEC may require.

(4) Earth removal not associated with the lawful construction of a building, structure, street or driveway, way, sidewalk, path, utilities, or other appurtenance incidental to any building, structure or street shall not be permitted within 200' of any Resource Area.

(5) All original topsoil shall be stockpiled on the site and spread on the final slopes. No original topsoil, including loam, may be removed from the site unless written permission is given by the Director.

(6) Hours of earth removal shall be limited and no work shall take place prior to 7:00a.m. after 7:00p.m., or on Sundays or Federal and State holidays.

(7) All structures and processing equipment shall be set back a minimum of 1000' feet from a building which either existed or for which a building permit has been issued at the time the earth removal is commenced and a minimum of 250' from all lot lines.

(8) The operation shall comply with all applicable Federal and State air pollution control laws and regulations. Dust shall be controlled so that there are no visible emissions or deposits present at the property boundary.

(9) The disposition of boulders, tree stumps, and unsuitable materials shall be shown on the applicable plans.

(10) Erosion, siltation, and dust shall be controlled during earth removal through measures including temporary slope stabilization, installation of ground covers, seeding if required by the Director, and street sweeping of adjacent public and private ways.

(11) Devices to muffle equipment noise, landscape earth berms, screen planting, decorative screen walls or other barriers or devices shall be installed as necessary to achieve compliance with Devens Industrial Performance Standards.

(12) Reclamation standards for earth removal. Within three months after the completion of the work, the Applicant shall restore the area affected; said area shall be covered with vegetation suitable to prevent erosion and with soils suitable to sustain such vegetation, except for exposed rock ledge.

(a) No area shall be left in such a condition that erosion of the area after completion of the work may result in water pollution by silt or other deleterious substances.

(b) The area shall be left in such shape and condition that material will not wash, block or obstruct drainage ways.

(c) Unless the area is intended to serve as an approved pond for recreation or other purposes, the area shall be left as free draining as practicable.

(d) The topography of the land shall be left so that water draining from the site leaves the property at the original, natural drainage points and in the natural proportions of flow.

(e) Unless otherwise allowed in writing by the Director, all disturbed areas not developed shall be spread with original topsoil or strippings, if any, to a minimum four-inch depth, and reseeded. Trees shall be planted in compliance with the landscaping requirements of these regulations.

(13) The removal of soil, loam, sand, gravel or any other mineral substances within four feet of the high groundwater table elevation (as determined by test pits, monitoring wells, or other methods acceptable to the DEC) is not permitted, unless the substances removed are re-deposited within 45 days of removal on site to achieve a final grading greater than four feet above the seasonal high water mark, except for excavations for the construction of building foundations or the installation of utility works, or wetland restoration work conducted in accordance with a valid Order of Conditions issued pursuant to M.G.L. c. 131, § 40.

4.08 Stormwater Management

(1) Objectives:

(a) To replicate natural conditions of infiltration, evapotranspiration, and runoff. In typical natural conditions, approximately 50 percent of stormwater infiltrates, 40 percent leaves land through evapotranspiration, and ten (10) percent leaves the land as runoff.

(b) To promote decentralized stormwater management systems modeled after natural hydrologic features and infiltration practices that facilitate local groundwater recharge [Low-Impact Development ("LID") techniques].

(c) To promote water conservation and efficiency through stormwater capture, treatment and reuse.

(2) General Provisions.

(a) All Applications, regardless of whether the project is subject to the Wetlands Protection Act or not, shall design the stormwater management system in

compliance with the Massachusetts DEP Stormwater Management Standards, January, 2008, as amended ("SMS") and the Massachusetts Stormwater Handbook, February 2008, as amended ("Handbook"). The Applicant shall submit a completed and endorsed Stormwater Management Form that indicates compliance with the SMS, in addition to any supporting calculations indicating compliance with the required standards.
http://www.mass.gov/dep/water/laws/policies.htm#storm

(b) Stormwater management systems shall comply with the following:

i. The Handbook which includes the SMS, Stormwater Best Management Practices, Documenting Compliance, Stormwater Report Checklist and TSS Removal Calculation Sheet.

ii. Devens Stormwater Pollution Prevention Plan (Stormwater Plan).

iii. Devens Water Resources Protection Report

(c) Where there is a conflict between the requirements set forth below and the Handbook and/or Plan, the Plan and the requirements below shall govern.

i. There shall be no negative impact from stormwater runoff on abutting properties and to any public or private water supply or designated potential future supply.

ii. Irrigation water shall be derived from detained treated stormwater (stormwater harvesting), or roof drainage to the maximum extent feasible. On-site cisterns may be installed to store water for irrigation.

iii. For all stormwater improvements, drainage calculations shall be prepared by the Applicant's Engineer in accordance with the SMS requirements and shall include design criteria, pre- and post-development drainage areas, and other information to verify the size and effectiveness of the proposed stormwater management technique. "Pre-development" drainage areas shall be considered to be "green fields" regardless of any development or improvements on the site at the time of application. Calculations shall be made separately for each drainage facility, showing its location, the total upstream drainage area, the underlying soil types and the flow paths for the times of concentration, the design runoff, facility size, slope, and capacity and velocity of water through all the site drainage system.

iv. Proposed activity that will temporarily or permanently disturb any land area at or below the elevation of the 100-year floodplain shall be avoided to the maximum extent feasible unless there are exceptional circumstances where such areas cannot be avoided. Under such circumstances, the Applicant shall demonstrate, to the satisfaction of the DEC, that there shall be no temporary or permanent loss of flood

storage area. For any areas within the 100-year floodplain where the DEC authorizes disturbance, temporary stabilization measures shall be implemented at all times, until permanent stabilization is achieved. No construction laydown areas or equipment shall be stored within the 100-year floodplain without emergency removal/relocation measures in place and approved by the DEC.

v. Recharge may not be required for land designated as an Area of Concern, if, according to the Base Closure Team in accordance with Base Realignment and Closure Act requirements, recharge will negatively impact ongoing environmental remediation.

vi. All projects shall incorporate LID techniques for stormwater management to the maximum extent feasible. For projects proposing traditional closed drainage systems, the Applicant shall demonstrate to the satisfaction of the DEC why LID stormwater management design methods are not feasible. For LID stormwater controls not referenced in this section (974 CMR 4.08) or the Handbook, or for which pollutant removal rates have not been provided, the effectiveness and pollutant removal of the structural control must be documented through prior studies, literature reviews, or other means and receive approval from the DEC before being included in the design of a stormwater management system.

(3) Design standards and criteria: All stormwater management systems shall meet the following:

(a) Biofiltration basins shall be the preferred method to reduce curbing, piping and structures and provide additional overland treatment and recharge. They shall be designed in accordance with the Handbook, in addition to the following:

1. Any low-flow outlets shall be designed to prevent clogging.
2. For bioretention cells, abutting pavement, that are designed to capture sheet flow, the edge of pavement shall be reinforced to ensure the integrity of pavement is maintained (curb stops, stone, turf, landscape timbers, plantings or other acceptable methods or combination thereof.)

(b) In addition to compliance with the SMS, the post-development peak rate of stormwater discharge off-site shall not be greater than the pre-development peak rate of stormwater discharge for the 2, 10, 25, 50 and 100-year storm events from any point of discharge on the site.

(c) There shall be no stormwater structures and/or point source discharges within 25 feet of the boundaries of any Resource Area unless the Applicant can demonstrate no adverse impact to the Resource Area.

(d) Side slopes above the design water level shall be 3:1 (horizontal to vertical) or flatter and conform to the slope of the existing topography without abrupt or unnatural breaks in slope, unless otherwise permitted under 974 CMR 4.08(4).

(e) Banks of wet ponds, swales not within maintained landscaped areas (such as lawns or parking lots), and other channels shall be vegetated with native woody plant material within ten feet of the high water elevation and with herbaceous plant material at the edge of the pond at the high water elevation. Trees shall not be planted on fill embankments.

(f) Shelves below the design water level (as described in the Stormwater Plan) shall be vegetated with hydrophytic native plant species at a density needed to establish full coverage by the next growing season. Plant plugs or pre-vegetated coir-mesh blankets or carpets are recommended materials.

(g) Recommended post-construction erosion control methods include geotextile and /or biodegradable erosion control fabrics staked or anchored to the slope, with loose weave to allow vegetative cover to be established. Vegetative cover shall consist of native woody plant species installed as live brush or nursery stock, or native grasses.

(4) Design standards and criteria for detention/retention/recharge basins: The design of stormwater and infiltration basins and associated structures shall:

(a) Minimize basin size to 5,000 square feet per basin or less (by using smaller catchment areas and/or alternative stormwater management design methods) and minimize disturbance to natural or re-established vegetated areas to the maximum extent feasible. If a basin exceeds 5,000 square feet, the Applicant shall demonstrate to the satisfaction of the DEC why a smaller size is not feasible. If a basin is a constructed stormwater wetland, it may exceed 5,000 square feet upon approval by the DEC. Constructed stormwater wetlands shall be designed in compliance with the SMS.

(b) Be located in naturally occurring low spots. Layout of the basins shall complement the natural topographic movement of the site [see 974 CMR 3.08(4) Figure D)] Rigid basin layout [see 974 CMR 3.08(5) Figure E] shall be avoided in all instances unless the basin's layout complements the overall design concept of the Site Plan.

(c) Utilize banks steeper than 3:1 (horizontal to vertical) only to tie into headwall/outfall structures. Banks steeper than 3:1 shall transition to slopes of less than 3:1 as quickly as possible to minimize areas of potential erosion. Specific post-construction erosion control methods shall

be detailed to ensure temporary and permanent stabilization of such areas will be achieved. Rip-rap/trap rock solutions shall not be acceptable, except as water dissipaters below storm water outfalls or as channel liners for steep swales.

(d) Have an emergency outlet to accommodate storm flows in excess of the 100-year storm event. A minimum 1-foot freeboard distance shall be established between the 100-year flood elevation and the top of embankment.

(e) Design basins/infiltration structures using the Natural Resource Conservation Service TR-20 methodology in accordance with the SMS.

(f) Locate the floor of all basins/infiltration structure/swales a minimum of four feet above the high groundwater elevation. High groundwater testing shall be conducted before the basin design at the proposed location of each basin in compliance with Title V (310 CMR Section 15.103), as most recently amended or reliable data pursuant thereto shall be provided.

(g) Conduct a falling head soil permeability test in retention/infiltration basins before the basin design in all basins and infiltration structures. Soil with a percolation rate of 2 minutes per inch or faster can be used to confirm the first NRCS Hydrologic Soil Group A with a Texture Class of Sand and an infiltration rate of 8.27 Inches per hour from the Rawls, et.al. table in the SMS. To use infiltration rates faster than 8.27 inches per hour, use 50% of the infiltration rate obtained from the falling head soil permeability test.

(h) Conduct percolation tests in detention basins before the basin design and shall be conducted in compliance with Title V (310 CMR Section 15.105), as most recently amended.

(i) Include fencing and/or screening of stormwater detention/retention basins if the DEC determines that safety or appearance require such measures.

(5) Design Standards and Criteria for Certain Structural LID Techniques:

(a) Vegetated Roofs - shall comply with the Handbook and the DEC Policy for Construction of Vegetated Roofs dated August 2011, as amended.

1. For the purposes of stormwater management system design, the area of roof covered by vegetation may be considered pervious and subtracted from the total proposed impervious area.
2. Vegetated Roofs within the Viewshed Overlay district shall comply with 974 CMR 3.04(8) (i) 5 and 6.

3. Landscaping plans for projects incorporating vegetated roofs and/or walls shall show the design and location of vegetated roofs and walls.

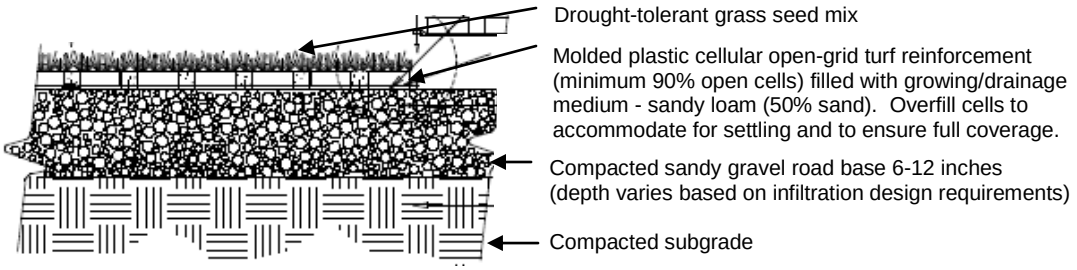
(b) Permeable paving [Porous asphalt, paving stones and pervious concrete] - May be used where the underlying soils have a permeability of at least 0.3" per hour but shall not be used on high-traffic/high speed areas or on stormwater "hotspots" with high pollutant loads. Permeable paving shall meet the SMS specifications (or alternatives approved by the DEC), in addition to the following:

1. Lined on the sides with a non-woven geotextile fabric to prevent influx of fines (no liner on bottom).
2. A gravel trench surrounding the edge of the pavement connecting to the stone reservoir below the surface of the pavement may be required as a backup in the event of surface clogs.
3. Installed by a qualified contractor with experience in permeable paving installation.
4. Specification layer depths required by the SMS may be increased based on volume storage requirements

(c) Additional Requirements for Pervious concrete –

1. Top layer: 6 inches of pervious concrete placed in two 3-inch courses.
2. Second layer: 4 inch course consisting of 1-1/3 inch crushed stone (structural support).
3. Third layer: 14 inches of open graded "bank run gravel" (Reservoir base).
4. Fourth layer: 6 inches of 3/8" crushed gravel (Capillary barrier).

(d) Reinforced Turf Parking/Emergency Access - May be constructed where the underlying soils have a permeability of at least 0.3" per hour but shall not be used on high-traffic/high speed area or on stormwater "hotspots" with high pollutant loads. Turf parking shall be designed to meet the SMS and the following specifications:



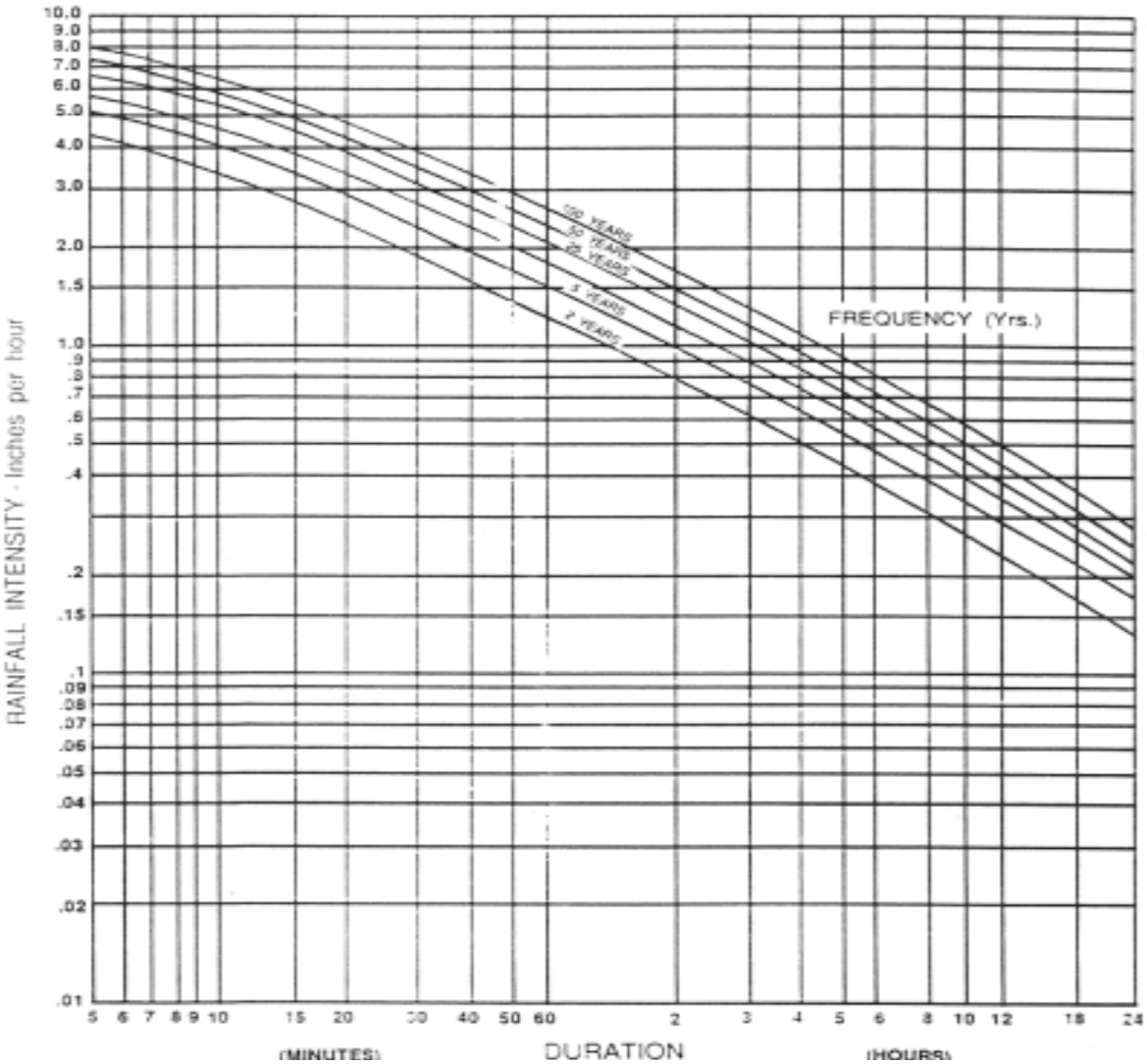
Alternative comparable reinforcement methods will be considered by the DEC on

a case by case basis.

(6) Closed Drainage Systems.

a. LID swale systems shall be utilized in parking lots not subject to truck traffic, truck and container storage, and other railroad related vehicles/equipment, to the maximum extent feasible.

b. Closed Drainage Systems (CDS) and swales shall be designed to accommodate the 25-year storm event based on the Rational Method without surcharging. The CDS shall be designed in accordance with the SMS. Intensity/duration/frequency curves for the Worcester area, as presented in Technical Paper 40 of the National Weather Service and the Massachusetts Hydrology Handbook for Conservation Commissioners, March 2002, as amended, shall be used in the drainage design calculations. The minimum time of concentration shall be five minutes.



Intensity – Duration – Frequency Curve for Worcester, MA

c. All drainage structures shall be constructed of pre-cast concrete.
d. Catch basins shall have oil traps and provide a four-foot sump.
e. Details for all drainage structures shall be provided.
f. Flow capacities shall be calculated, using two feet per second (fps) minimum velocity and 10 fps maximum velocity under a 2-to-25 year design storm event. The designer shall account for partial pipe flow capacities, if applicable to the design.
g. Catch basin to catch basin connections are prohibited in paved areas.
h. Sub-surface infiltration systems are considered closed drainage systems and shall at a minimum meet an 80% TSS removal rate prior to infiltration to reduce maintenance and potential for system failure and replacement.

(7) Monitoring and Maintenance of Stormwater Facilities. An Operation and Maintenance Plan (O&M Plan) for stormwater management systems is required at the time of application for all projects. The O&M Plan shall be designed to ensure compliance with the Massachusetts Surface Water Quality Standards (314 CMR 4.00), the Stormwater Plan and the DEC annual stormwater reporting form requirements. The O&M Plan shall be shown on the site plan(s) and shall include at a minimum the following:

(a) The name(s) of the owner(s) for all components of the system.

(b) A statement that the Applicant is responsible for the operation and maintenance of the entire on-site system.

(c) An O&M Inspection and Maintenance Schedule which shall include:

1. Parking Lot Sweeping: with mechanized cleaning equipment on an annual basis.
2. Catch Basin Cleaning: Catch Basins and Infiltration Chambers shall be inspected on a bi-annual basis. Any sediment accumulations in excess of half of the unit's sump depth shall be removed. Material shall be removed by a licensed contractor, who shall be responsible for disposing of the material off-site in a manner consistent with all local, state and federal regulations.
3. Infiltration Swales: Ensure proper establishment of full vegetative cover. Swale embankments and side slopes must be properly maintained to ensure long-term stability. Annual and seasonal inspections are required to ensure a healthy groundcover is maintained to avoid erosion and promote infiltration. Bare spots shall be repaired and planted with native ground cover material. Saplings and large shrubs shall be removed to maintain integrity of the swale. Level spreader shall be inspected seasonally to remove any build up of sediment and ensure proper drainage flows.
4. Detention/Retention Basin Inspection and Maintenance: Wet and dry basins shall be inspected annually to ensure inlets and outlets remain unobstructed. Inlets and outlets and forebays shall also be

inspected for potential sediment, erosion, cracking, tree growth, damage to the emergency spillway and erosion within the basin and on within the banks. Upper side slopes, embankment and emergency spillway shall be mowed annually. Any tree saplings shall be removed. Accumulated sediment shall be removed as necessary and at least once every ten years. Bare spots shall be repaired and planted with native ground cover material.

5. Biofiltration Systems: Quarterly inspections for accumulated sediment shall be performed. Debris, sediment accumulation, erosion shall be removed/repaired at least twice a year. Any dead or damaged plantings shall be replaced. All invasive species shall be removed on an annual basis. Re-mulch any void areas by hand. Native grasses and plants shall be maintained by hand without the use of fertilizers and limited use of organic herbicides. Trimming of surrounding grasses shall be restricted to a minimum of 5 inches. When cation exchange capacity of soil media decreases, the soil media shall be replaced to prevent contaminants from reaching the groundwater.

6. Sediment Trap/Oil-Water Separator: Shall be inspected annually for sediment and debris accumulation. Any sediment accumulations in excess of half of the unit's sump depth shall be removed. Material shall be removed by a licensed contractor, who shall be responsible for disposing of the material off-site in a manner consistent with all regulations.

7. Sub-Surface Infiltration Systems: Shall be inspected annually for proper function and sediment accumulation. Accumulations of sediment and/or materials that negatively impact the infiltration capacity of the system shall be removed.

8. Constructed Stormwater Wetlands: In the first three years after construction, Applicants shall inspect the constructed stormwater wetlands twice a year during both the growing and non-growing seasons. After three years such inspections shall occur on a periodic basis. During these inspections, the following information shall be recorded:

a. The types and distribution of the dominant wetland plants in the marsh;

b. The presence and distribution of planted wetland species;

c. The presence and distribution of invasive wetland species (invasives shall be removed);

d. Indications that other species are replacing the planted wetland species;

e. Percentage of standing water that is unvegetated (excluding the deep water cells which are not suitable for emergent plant growth);

f. The maximum elevation and the vegetative condition in this zone, if the design elevation of the normal pool is being maintained for wetlands with extended zones;
g. Stability of the original depth zones and the micro-topographic features; and
h. Accumulation of sediment in the forebay and micropool; and survival rate of plants (cells with dead plants must be replanted). Sediment forebays must be cleaned annually.

(d) Applicants shall submit annual stormwater monitoring and maintenance reports to the DEC addressing inspection and maintenance of the BMPs. The reports shall include:

1. Descriptions of the condition of the BMPs,
2. Descriptions of maintenance performed and,
3. Receipts for maintenance performed.

For ease of reporting, the DEC and MassDevelopment have created standard annual reporting templates for use by all Applicants. Failure to submit the required annual report is a violation of the Unified Permit.

4.09 Water Resource Protection Overlay Districts (WRPs)

(1) Purpose:

(a) To protect the ground and surface water resources in Devens and abutting communities in order promote health, safety and general welfare;
(b) To promote statewide goals for surface water quality in the Nashua River Basin; and
(c) To prevent the temporary or permanent contamination of soils, surface water, and ground water on Devens.

(2) General Requirements. Projects located in the WRPs shall utilize those BMPs most appropriate to the site conditions, with consideration given to the level of protection needed in the particular WRP. Provision of appropriate BMPs will further the goals of pollutant reduction of total suspended solids, petroleum hydrocarbons, lead, zinc, copper, and total nitrogen and other non-point source pollution. The BMPs and other protective measures for each WRP increase progressively from the Watershed WRP, to the Aquifer WRP, to the Zone II WRP. The Zone II Requirements include those for the Watershed and Aquifer WRP, while the Aquifer WRP includes the Watershed WRP Requirements:

(a) Watershed WRP Requirements:

1. All projects in the Watershed WRP shall comply with the By-Laws (Article XI), the SMS, the Devens Water Resources Protection Report, November 1994 and the Stormwater Plan, including, but not limited to Water Conservation Measures, Storage and Application of Deicing Materials, Transportation of Hazardous Materials and Waste,

Hazardous Waste and Materials, Storage Tanks, Radioactive Materials and Medical/Research Wastes.

2. Water conserving plumbing fixtures (EPA Water Sense labeled or equivalent) shall be utilized for all projects to the maximum extent feasible. Such fixtures shall meet the Massachusetts Plumbing Code.

3. Facilities that store or propose aboveground storage of oil in quantities greater than 1,320 gallons, and/or in any container greater than 660 gallons in capacity, and/or underground storage of oil greater than 42,000 gallons, are regulated under 40 CFR 112 and are required to develop a site-specific Spill Pollution Prevention Control and Countermeasure Plan (SPCC) that meets the requirements of 40 CFR 112 and the Devens Master SPCC Plan, dated February 27, 2001 http://www.devensec.com/forms/spill_prevention_report.pdf . Devens also has a Comprehensive Emergency Management (CEM) Plan to address preparedness, response, mitigation and recovery for man-caused emergency situations and natural disasters. Within the CEM Plan is a Hazardous Materials Emergency Plan. SPCCs shall be consistent with the CEM Plan and Hazardous Materials Emergency Plan. Facilities that are regulated under 40 CFR 112 may also be subject to the Facility Response Plan requirements set forth in, 40 CFR 112.20.

4. Pesticide applications shall not be used unless there are no other means of controlling pests. Organic fertilizers shall be used in place of chemical applications to the maximum extent feasible. Projects that propose pesticide applications on more than 1 acre of land shall prepare an Integrated Pest Management (IPM) Plan in accordance with the Massachusetts Department of Food and Agriculture Pesticide Bureau IPM Kit for Building Managers http://www.mass.gov/agr/pesticides/publications/docs/IPM_kit_for_bldg_mgrs.pdf . Such plan shall be submitted to the DEC as part of a Unified Permit Application. Fertilizer and pesticide application amounts shall be based on soil testing. Blanket fertilizer and pesticide applications shall be prohibited.

5. The use of motorized off-road recreational vehicles shall be prohibited within the DREZ.

6. Any facility subject to 310 CMR 30.660 that receives Hazardous Waste after July 26, 1982 shall monitor for specific constituents, in accordance with 310 CMR 30.662.

(b) Aquifer WRP Requirements: In addition to compliance with the Watershed WRP requirements, projects in the Aquifer WRP shall:

1. Provide a Hazardous Material Spill Response Plan that lists methods for the interception and isolation of potential spills of hazardous materials for review and approval by the DEC as part of a Unified Permit Application. Clean-up of spills shall be completed in accordance with the Hazardous Material Spill Response Plan or as specified in the Devens Spill Prevention Control and Countermeasure Plan.

2. Include a list of all Hazardous Materials proposed to be used on-site (type, quantity, location and method of storage).

3. Maintain the high level of water quality at Devens and within the Aquifer WRP. A Groundwater Quality Monitoring Plan (GWQMP) shall be developed for industrial projects and/or uses involving the handling, treatment, storage, or generation of hazardous waste as defined under 310 CMR 30.000 in excess of those quantities allowed for a Very Small Quantity Generator. The GWQMP shall be prepared by a Licensed Site Professional, Professional Engineer or Certified Professional Geologist or Hydrogeologist experienced in groundwater flow and contaminant fate and transport and comply with 310 CMR 30.663. The GWQMP shall include the following information as a minimum:

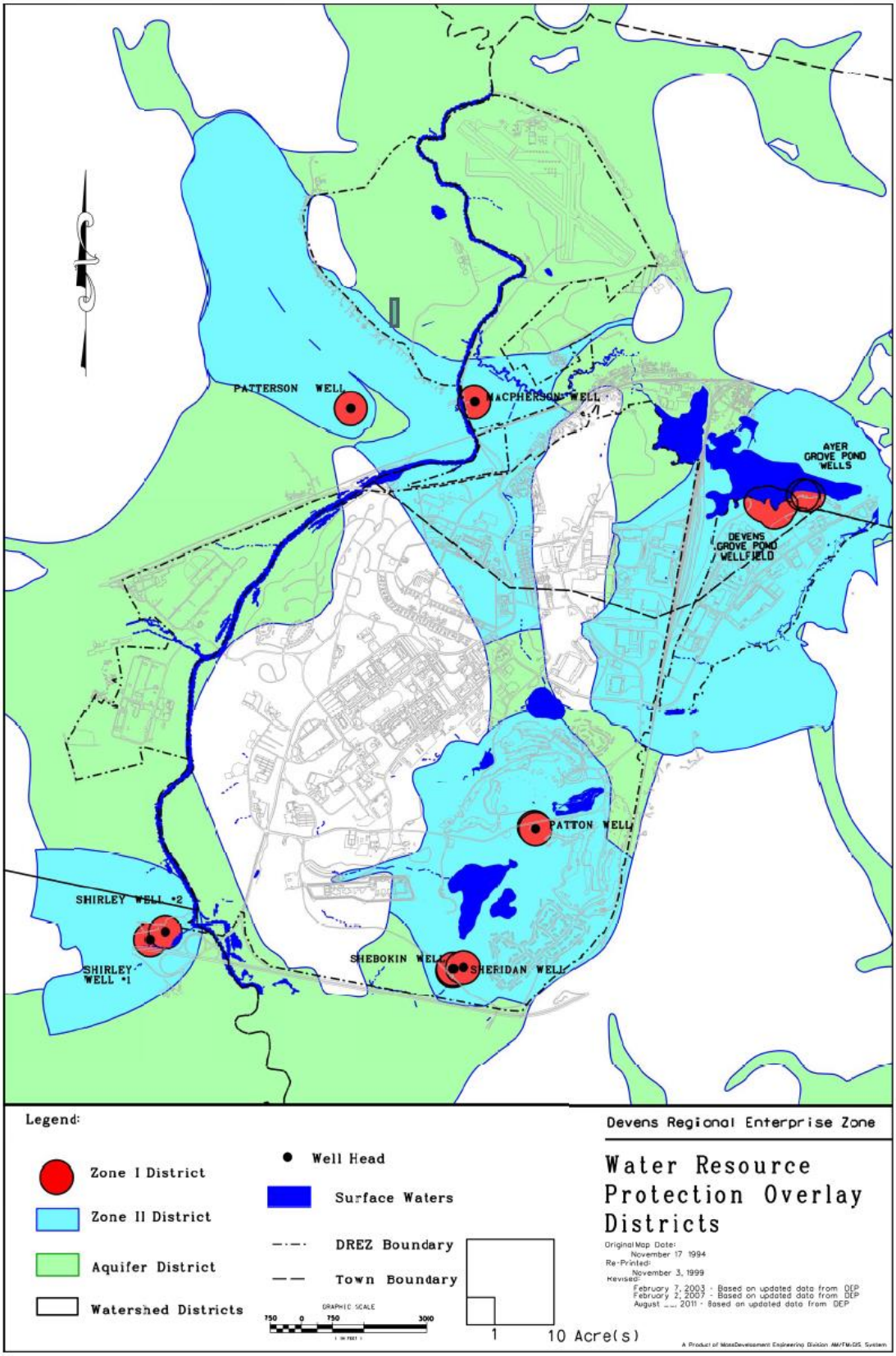
a. The overall hydrogeological profile of the project site and the area in general;
b. The groundwater flow direction and elevations through the areas of disturbance within the project site;
c. Location of up-and down-gradient monitoring wells;
d. Sampling objectives;
e. Sampling collection and analysis summary;
f. Chain of custody and quality control/quality assurance procedures for testing;
g. Sampling frequency; and
h. Pollutant-testing parameters and methods of testing. Pollutant-testing parameters in accordance with 310 CMR 30.664 and shall include as a minimum, EPA Priority Pollutants, total petroleum hydrocarbons (as required by ASTM D3328-78), metals (lead, zinc, copper), oil and grease, pH, and other pollutants consistent with the activities associated with the proposed use required to ensure that the development will not degrade water quality as determined by State and Federal drinking water quality standards.
i. Monitoring well drilling details in accordance with the MA DEP Standard References for Monitoring Wells, Part I (DEP Publication#WSC-310-91 as amended)
j. Compliance monitoring program in accordance with 310 CMR 30.671.

4. Ensure post-development volume of discharge shall not exceed the pre-development volume of discharge for the two and ten year storm events as required by the SMS. Stormwater recharge shall maintain or exceed pre-developed levels of recharge for the two year storm event. In the absence of hydrogeologic analysis, stormwater systems that have been designed to recharge for the two-year storm event will be presumed to have met this criterion. If the site geology is unsuitable (for example, glacial till), the Applicant shall consider other stormwater infiltration BMP's to meet this requirement. If none prove feasible**,** this requirement may be waived by the DEC, based on provision of sufficient data by the Applicant.

(c) Zone II WRP Requirements. In addition to compliance with the Watershed WRP and Aquifer WRP Requirements, projects located in the Zone II WRP shall also comply with the following:

1. Utilize BMP's to comply with the SMS requirements for total suspended solids, petroleum hydrocarbons, lead, zinc, copper and nitrogen removal rates from runoff prior to groundwater recharging and/or stormwater discharging from the site. Water quality evaluations shall be based on a two-year storm event. Biofiltration systems for stormwater pollution mitigation are required to the maximum extent feasible.
2. All projects that propose to utilize Hazardous Materials totaling 50 gallons liquid volume or 25 pounds dry weight or more in a calendar year shall register with the Devens Fire Department as required by 974 CMR 4.09(5).
3. Treatment or disposal works for wastewater (other than sanitary sewage) subject to 314 CMR 5.00 are prohibited. This includes, but is not limited to, treatment or disposal works related to activities under the Standard Industrial Classification (SIC) Codes set forth in 310 CMR 15.004(6) (Title 5), except the following:
    a. the replacement or repair of an existing system(s) that will not result in a design capacity greater than the design capacity of the existing system(s); and
    b. treatment works approved by the MA DEP designed for the treatment of contaminated ground or surface waters and operated in compliance with 314 CMR 5.05(3) or 5.05 (13); and
    c. publicly owned treatment works,
4. Commercial fertilizer storage and animal manure storage is prohibited unless such storage is within a structure designed to prevent the generation and escape of contaminated runoff and leachate.
5. Storage of sludge and septage, as defined in 310 CMR 32.05, is prohibited unless such storage is in compliance with 310 CMR 32.30 and 310 CMR 32.31

4.09 Figure 1: Water Resource Protection Overlay Districts Map



(3) WRP Map: Zone II, Aquifer and Watershed WRP boundaries are shown on the map entitled: "Devens Regional Enterprise Zone Water Resources Protection Overlay Districts". Prepared by MassDevelopment Engineering Division, in consultation with the DEC and the MA DEP, dated November 17, 1994, as amended. (974 CMR 4.09 Figure 1).

(4) Redefinition/redelineation of WRP district boundaries: If the location of the district boundary in relation to a particular parcel is in doubt, resolution of boundary disputes shall be through the DEC. The burden of proof shall be upon the Applicant to show in which WRP the land should be located. The Applicant shall submit documentation certified by an Engineer, hydrologist, geologist, or soil scientist (as appropriate) to demonstrate more accurately the boundaries of the district with respect to the Applicant's land. This analysis shall include testing as needed to demonstrate the correct classification of the land in question.

(5) Control of Hazardous Waste and Materials in WRP's

(a) Applicability: The requirements below apply to hazardous material which is defined for purposes of this section 974 CMR4.09(4) as a product, waste or combination of substances which because of its quantity, concentration, or physical, chemical, toxic, radioactive or infectious characteristics may reasonably pose a significant, actual, or potential hazard to human health, safety, welfare, or the environment when improperly treated, stored, transported, used, disposed of, or otherwise managed. Hazardous materials include, without limitation, synthetic organic chemicals, petroleum products, heavy metals, radioactive or infectious materials, and all substances defined as "toxic" or "hazardous" under Massachusetts General Laws (MGL) Chapters 21C and 21E using the Massachusetts Oil and Hazardous Material List (in 310 CMR 30.000 and 40.000).

(b) Hazardous Material Requirements and Restrictions in WRP's: Unless otherwise stated, the following requirements and restrictions apply to all WRP's:

1. Other than that which is allowed by state or federal laws, regulations, and/or permits, the discharge of hazardous materials within any WRP is prohibited. This prohibition includes, but is not limited to, discharges of hazardous materials to exposed and unsaturated soils; wetlands; surface water resources; ground water; sanitary sewers; storm drains; floor drains and sinks which discharge to the environment; and septic systems.
2. The sale and/or use of septic system additives or cleaners not specifically allowed by MA DEP (310 CMR 15.027 & 15.028) is

prohibited.

3. Aboveground storage of hazardous materials shall be in product-tight containers, in an orderly manner, with wastes stored separately from unused materials, and on an impervious surface. Outdoor storage shall be designed to contain spills of not less than 110% of the volume stored and prevent any flow of product to exposed soils or outside drains, and shall be protected from the elements, accidental damage, and vandalism. Indoor storage shall be designed (via a berm or other means of secondary containment) to prevent any flow of product to exposed soils, floor drains, or outside drains. All storage shall be in accordance with 527 CMR 9.00.

4. All Hazardous material storage areas shall be clearly delineated and signs shall be posted noting the dedicated nature of the area. Containers of all non-waste hazardous materials shall be labeled with the name of the product or chemical, a listing of the physical and health hazards associated with it, and target organ effects from exposure. Containers of hazardous wastes shall also be labeled as a "Hazardous Waste," with the name of the waste (e.g., "Waste Oil"), Hazardous Waste Generator ID#, and the date the container began accumulating waste also being noted on the container.

5. The installation of new underground storage containers for Hazardous materials other than for chemicals used in the treatment of a public drinking water source is prohibited in all Zone II WRPs.

(c) Registration of Hazardous Materials in WRPs:

1. Every owner or operator of a facility (including municipal, state and federal) which uses hazardous materials totaling fifty gallons liquid volume or twenty-five pounds dry weight or more in a calendar year and which is located within a Zone II WRP shall register with the Devens Fire Department on or before March 1, 2002 and every three years thereafter. A registration fee shall be paid to the Devens Fire Department at the time of registration and/or renewal.

2. Existing and future underground storage tanks for Hazardous materials shall be registered with the Devens Fire Department in accordance with the requirements of 310 CMR 40.000. Any underground heating oil storage tank which does not meet current standards (as set forth in 527 CMR) for new and replacement tanks and is fifteen (15) years or older and is located within a Zone II WRP shall be removed and replaced or upgraded, to meet current standards, within five (5) years of the effective date of this Regulation, or sooner if directed by the Devens Fire Department. Registration requirements shall be established by the Devens Fire

Department in accord with 310 CMR 30.00 and 40.00.

3. Updating of Registration:

a. If, during or after the registration period, a change in ownership and/or occupancy of a business occurs, an updated registration shall be submitted to the Devens Fire Department within thirty days of the change. Registration is not transferable between past and future owners of a business and/or occupants of a facility.

b. If any of the following activities occur during or after the registration period, the corresponding information in the business registration package shall be highlighted and corrected at the time of registration renewal:

i. remodeling, operating changes, or expansion of an existing facility which would modify the type or quantity of hazardous materials managed;

ii. changes in the location or method of use, storage, manufacture or handling of hazardous materials in any facility; and/or

iii. addition of new hazardous materials meeting the threshold quantity listed above which are not anticipated in the registration.

4. Facility Closure. In the event that a facility permanently ceases operations during its registration period, the owner or operator of the facility shall notify the Devens Fire Department in writing at least 30 days before the closure.

(d) Exclusions: The following materials, activities, and facilities are not within the scope of this regulation:

i. Household waste including garbage, trash, and domestic sanitary sewage.

ii. Wastes generated from the growing of agricultural crops and the raising of animals, including manure which is returned to the soil as fertilizer.

iii. The labeling of hazardous materials which are or will be exposed for sale at retail establishments.

iv. Treatment, Storage, and Disposal Facilities as defined by 310 CMR 30.000.

v. Large Quantity Generators of hazardous wastes as defined by 310 CMR 30.000.

vi. Facilities that file Tier II reports as defined by SARA Title III.

(e) Emergencies:

1. Notification: In case of a spill and/or loss of hazardous material *at or above the "reportable quantity*," [as defined in 310 CMR 40.000] the owner/operator must report the spill or loss to the Devens Fire

Department and MA DEP's Emergency Response Section within 2 hours of the incident in accordance with 310 CMR 40.0000.

2. Planning: The following precautions shall be taken by all facilities subject to the registration and reporting requirements set forth above:

i. A map of the facility layout showing Hazardous Material storage areas and all means of egress, along with any additional details as specified by the Devens Fire Department shall be posted at one or more on-site locations. The posting location(s) shall be specified during registration.

ii. Materials Safety Data Sheets shall be kept on file at all times at an on-site location, and must be readily available during routine inspections and in the event of an emergency.

iii. Facilities shall provide adequate and reasonable employee training programs to ensure the proper use, storage, transportation and handling of hazardous materials.

iv. Facilities shall provide emergency spill containment kits on site and in accessible areas and all employees shall be trained in their use.

(6) Storage of fuel, combustible and flammable liquids, as defined by 42 U.S.C. section 6901-6922i, G.L. c. 148, and 527 CMR 9.00:

(a) Storage of flammable, combustible and explosive material shall be in accordance with the DEC Licensing and Registering the Storage of Flammables, Combustibles and Explosives Requirements, Policies and Procedures. A license for the storage of flammable or combustible fluids in quantities in excess of those allowed under 527 CMR 14.03 shall be obtained from the DEC.

(b) In accordance with 527 CMR 6.08(b), propane gas stored in excess of 2,000 gal. also requires a license. Storage of Explosives may also require a license in accordance with 527 CMR 13.

(c) All license applications are subject to a Level 2 Review under 974 CMR 1.04 and require a public hearing. State form FP-2A on the MA Department of Fire Services website shall accompany the DEC Level 2 Permit Application. Devens Fire Department sign off on the License application is required prior to submittal to the DEC.

(d) A separate permit for storage of flammable or combustible fluids is also required from the Devens Fire Department and must also accompany the License Application.

(e) The license shall be plainly posted on the premises.

(f) A parcel of land may only have one license for the storage of flammable or combustible fluids.

(g) If the conditions, capacities or restrictions authorized by a license change, an amended license shall be obtained. A new Level 2 application shall be submitted to the DEC and a new public hearing is required. If

granted, the amended license supersedes and replaces the old license, and will show the aggregate total capacities allowed under the grant. A Certificate of Registration (State Form FP-5) shall be filed with the DEC by the license holder or occupant of licensed land annually, before April 30. This registration signifies that a license is in use and currently being exercised. A Certificate of Registration is considered a Level 1 Review (Administrative Approval). If a registration is not applied for and issued annually by May 30, it may be viewed as cessation and cause for review and termination of the license. A registration shall be posted on the premises in a way in which it is visible.

(7) Storage, transportation and handling of radioactive materials and medical/research wastes in accordance with 42 U.S.C. sections 2011-2296, G.L. c. 111 H and c. 94 B, and 105 CMR 120.00: (reserved)

(8) Floor drains in accordance with applicable state (310 CMR 27.00 underground injection control) regulations and applicable federal laws and regulations, no floor drain(s) shall discharge to the ground, a leaching structure, or septic system in any facility. All floor drains shall connect to the sanitary sewer. All existing facilities with floor drains shall comply with 974 CMR 8.08.

(9) Use of pesticides and herbicides in accordance with G.L. c. 128 section 64, 330 CMR 15.00, and applicable federal laws and regulations: (reserved)

(10) Penalties Failure to comply with provisions of this regulation may result in enforcement action (974 CMR 1.14).

4.10 Renewable Energy Facility Requirements (REFs)

(1) Purpose:
- (a) Promote renewable energy facilities at Devens in order to:
  - (i) Reduce reliance on non-renewable energy sources,
  - (ii)Reduce greenhouse gases, and
  - (ii)Improve air quality.
- (b) Promote public health and further the sustainable redevelopment.

(2) Permitted uses. For purposes of this Section 4.10 REFs include only free-standing solar photovoltaic (PV) and solar thermal facilities and building-integrated wind and/or solar facilities.
- (a) PV and solar thermal REFs are permitted in all zoning districts except Open Space and Recreation.
- (b) Building-integrated wind and/or PV REFs are permitted in all zoning districts.

(3) General Requirements. REFs shall comply with the pertinent subsections

of 974 CMR 1.13, 974 CMR 3.02 through 3.04, 974 CMR 4.00, and 974 CMR 6.00 and the requirements set forth below.

(a) All utility connections shall be underground. Electrical facilities for utility interconnections may be above-ground only if required by the utility provider.

(b) REFs and associated structures shall be screened to the maximum extent feasible using a combination of topography, vegetation, clustering and any other methods acceptable to the DEC.

(c) Signs on a REF or at the site of the REF shall comply with 974 CMR 6.00 and identify the owner and provide a 24-hour emergency contact phone number. REF's shall not be used for advertising purposes.

(d) REFs shall comply with the State Building Code.

(e) For all REFs the Applicant shall provide:

1. Evidence of liability insurance in an amount and duration, sufficient to cover loss or damage to persons and property caused by the REF.
2. Authorization from MassDevelopment (Devens Utilities) for an interconnected customer-owned generator. Off-grid systems are exempt from this requirement.
3. A letter of approval from the Devens Public Safety Officer/Fire Chief.
4. A handbook for operating and maintaining the REF, safe access to the REF in accordance with the requirements of the Devens Public Safety Officer, and the REF stormwater management system. Maintenance shall include, but not be limited to, measures to ensure the paint is in good repair, the structure is well-maintained, and the site is secure.
5. A letter signed by an Engineer certifying that the REF complies with all local, state and federal laws and regulations.
6. One or three line electrical diagram detailing the associated components, and electrical interconnection methods, with all National Electrical Code compliant disconnects and overcurrent devices.
7. Performance guarantees for removal of REF's and restoration of the site in the event of catastrophic failure, collapse, or other destruction of all or part of the REF which renders the REF obsolete and/or inoperable. The Director may review the guarantees periodically and require additional surety to be posted. The DEC may waive this requirement for municipally or state-owned facilities. REF performance guarantees shall comply with 974 CMR 1.13.

(4) Decommissioning. For purposes of this Section 4.10 "decommissioned" shall mean the Applicant has stopped operating and/or maintaining the REF.

(a) In the event the Applicant has decided to stop operating the REF and has notified the DEC by certified mail of the proposed date of discontinued

operations and plans for removal of the REF and associated facilities, the Applicant shall.

1. Physically remove from the site no more than 150 days after the date operations were discontinued, all REF's and associated apparatus, structures, equipment, security barriers and transmission lines and
2. Restore and fully stabilize the site to the satisfaction of the DEC. The DEC may allow the landscaping or designated below-grade foundations to remain in order to minimize erosion and disruption to vegetation, and
3. Dispose of all solid and hazardous waste in accordance with local and state waste disposal regulations.

(b) In the event the DEC determines that a REF has not been operating and/or maintained for at least one year and the Applicant has not notified the DEC as required by 4.(a) above, The DEC and/or MassDevelopment may enter the REF site and perform the removal at the Applicant's expense.

(5) Requirements Specific to Certain REFs:

(a) Applicants for Ground-Mounted REFs shall provide:

1. Site Plan(s) and details of the PV installation stamped by an Engineer showing the proposed layout of the entire system and any potential shading from nearby structures/vegetation.
2. Documentation/details of the major system components to be used, including the PV panels, mounting system, and inverter;
3. Name, address, and contact information for proposed system installer;
4. Documentation of actual or prospective access and control of the project site;
5. All means of shutting down the PV installation shall be clearly marked. The Applicant shall identify a responsible person for public inquiries throughout the life of the REF.

(b) Applicants for Building-Integrated REFs shall provide:

1. Documentation signed and/or stamped by an Engineer, demonstrating that the building is structurally sufficient to support the permanent installation of the proposed REF(s). At a minimum, there should be an analysis that addresses weight, vibration, wind load, and snow load.
2. Elevation drawings of the building with the proposed REF(s) installed, viewed from north, south, east, and west (if systems are visible from the road and/or abutting properties).
3. Building schematic detailing point(s) of connection and associated attachment methods/supports for the proposed REF(s).
4. Specification sheets for the proposed REF(s)(inverters, controllers, disconnects, etc.).
5. Design approval letter from MassDevelopment.

(6) Ground-Mounted Wind Energy REFs - Reserved

4.11 Greenhouse Gas Mitigation

(1) Purpose: To promote:

(a) Development that furthers the State's policy of reducing greenhouse gas emissions and is consistent with Compliance with the Executive Office of Energy and Environmental Affairs 2008 Notice of Project Change for Devens;

(b) Improved air quality in a non-attainment zone; and

(c) Sustainable redevelopment goals of the Devens Reuse Plan and Bylaws.

(2) General Requirements:

(a) Applicants for projects requiring Level 2 review shall join the Devens Eco-Efficiency Center and demonstrate compliance with EcoStar Standard 24 – Climate Change Mitigation;

(b) Projects that (i) generate 2,000 or more average daily trips (adt) or (ii) generate1,000, or more adt and involve construct150 or more parking spaces, or (iii) involve construction of 300 or more parking spaces shall comply with the MA Stretch Code (780 CMR 120AA) as amended, and

(c) Projects that require a MassDEP Air Quality Permit shall have a roof for which at least thirty (30) percent shall be vegetated, which vegetated portion shall comply with the DEC's Policy for Construction of Vegetated Roofs, dated August 2011, as amended.

REGULATORY AUTHORITY

974 CMR 4.00: St. 1993, c. 498.

DEVENS

By-Laws

THE JOINT BOARDS OF SELECTMAN

- *Town of Ayer*
- *Town of Harvard*
- *Town of Lancaster*
- *Town of Shirley*

Massachusetts Development Finance Agency

DEVENS
ENTERPRISE • COMMISSION

DEVENS
MASSACHUSETTS

NOVEMBER 14, 1994
REVISED JULY 2015

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ARTICLE I. GENERAL PROVISIONS

A. Authority

1. These By-Laws, hereinafter the "By-Laws," shall be known and may be cited as the Zoning By-Laws of the Devens Regional Enterprise Zone established pursuant to Chapter 498 of the Acts of 1993 (the "Act"), as adopted by (i) the Towns of Ayer, Harvard, and Shirley (the "Towns"), (ii) the Massachusetts Government Land Bank (the "Land Bank"), and (iii) the Division of Capital Planning and Operations ("DCPO").

2. The By-Laws are adopted pursuant to the legal authority provided by the Act.

B. Purpose

The Reuse Plan, By-Laws, and Regulations shall govern land development activities within Devens. The By-Laws establish objectives, policies, and standards to promote the expeditious and orderly conversion and redevelopment of Fort Devens for primarily civilian uses, including, but not limited to, industrial, commercial, residential, recreational, and conservation uses; and for the development of public facilities, utilities, and infrastructure necessary to support those uses.

C. Legal Relation Among the By-Laws, the Reuse Plan, and the Commission Regulations

1. Reuse Plan:

   The Act requires the development and approval of both a Reuse Plan, hereinafter the "Reuse Plan," and the By-Laws. As provided in the Act, the Reuse Plan describes the physical characteristics of Devens, including, but not limited to, existing buildings, utilities, roads, and environmental features. The Reuse Plan also describes the planning process that has resulted in the identification of various preferred reuses of Devens and the methods and procedures by which the reuse of Devens will proceed. The Reuse Plan, when read in concert with the By-Laws, establishes a comprehensive plan for the reuse of Devens.

2. By-Laws:

   As provided in the Act, the By-Laws furnish the legal foundation and procedural structure for the implementation of the planning and reuse goals and objectives set forth in the Reuse Plan. The By-Laws (i) identify the various zoning districts and overlay districts and land uses and range of activities that will be permitted in each of the zoning and overlay districts; (ii) establish measures of density and intensity for development allowable in each zoning district and in each overlay district; and (iii) establish the general procedures through which the By-Laws will be administered.

3. Commission Regulations

   As provided in the Act, the Commission shall develop and adopt a comprehensive and detailed set of land-use regulations, hereinafter the "Regulations," not later than July 14, 1995. The Regulations shall be consistent with the By-Laws and shall provide additional substantive and procedural controls over the reuse of Devens. The Regulations shall contain detailed land-use controls, including, but not limited to, site design standards, subdivision control standards, watershed and water resource protection standards, standards and procedures required to ensure full compliance with state wetlands protection laws, and historic district regulations. The Regulations shall contain administrative, procedural, and enforcement provisions to be utilized by the Commission for the implementation of the Reuse Plan and By-Laws. The Regulations shall also incorporate the streamlined permitting process established by the By-Laws. The Commission may adopt and enforce interim regulations, which may include existing regulations of the Towns, consistent with the By-Laws.

D. Effective Date of By-Laws

The By-Laws shall be effective within thirty (30) days from the date on which the last of the Towns approves the Reuse Plan and By-Laws. The town clerk in each Town shall provide a written notification to the Land Bank stating the results of the town meeting vote on the Reuse Plan and By-Laws.

E. **Severability**

The provisions of the By-Laws are severable and if any of its provisions shall be held unconstitutional or otherwise unenforceable by any court of competent jurisdiction, the decision of such court shall not affect or impair any of the remaining provisions.

ARTICLE II. ADMINISTRATION OF THE DEVELOPMENT OF DEVENS

A. **Composition of Commission. Meetings. Notice of Meetings and Public Hearings. Quorum. Minutes of Meetings. Decisions of Commission. and Subcommittees**

1. The Commission shall be comprised of twelve commissioners who shall be appointed and serve in accordance with the provisions of section 9 of the Act.

2. A quorum for the Commission shall consist of seven (7) members. Except as provided in the Act or herein, any action of the Commission shall be taken by majority vote of the quorum then present at a meeting, provided, however, that a majority of the full membership of the Commission (seven [7] votes), shall be required to approve a variance under Article IV A, a request for reconsideration under Article IV C - E, or delegation of powers to the Land Use Administrator, as provided herein. Approval of the Regulations shall require a two-thirds (2/3) vote of the Commission or eight (8) votes.

3. The Commission shall establish a regular meeting schedule for purposes of reviewing, evaluating, and acting upon matters within the scope of its authority, as set forth in the By-Laws.

4. The meetings of the Commission shall be governed by the Open Meeting Law, G.L. c. 3OA sections llA and llA½. Whenever feasible, the agenda for each Commission meeting shall be available in advance of the meeting.

5. The Commission shall provide written notice to the clerks of each of the Towns for immediate posting, and to the board of selectmen and the planning board of each of the Towns, at least seven (7) days prior to the date on which a meeting of the Commission is scheduled to take place. Meetings shall be held within the boundaries of the Devens Regional Enterprise Zone, unless otherwise agreed to by the Commission for a particular meeting.

6. Wherever the By-Laws require the Commission to hold a public hearing, the Commission shall provide notice of the time, place, and a brief statement of the subject matter of such hearing to the clerks of each of the Towns for immediate posting and to the board of selectmen and the planning board of each of the Towns, at least fourteen (14) days prior to the date on which the public hearing is scheduled to take place. Such notice shall also be given by publication in a newspaper of general circulation in the Towns once a week for two (2) successive weeks, with the first publication being not less than fourteen (14) days prior to the date of such public hearing. Where notice to individuals, including abutters, is required, notice shall be sent by mail, postage prepaid. Documents related to such hearing shall be made available for inspection in the offices of the Commission or at another designated location. The Commission may accept a waiver of notice from or an affidavit of actual notice to any person entitled to notice hereunder.

7. Minutes shall be kept of all Commission meetings.

8. The Commission's records, where defined as Public Records pursuant to G.L. c. 4 section 7, shall be subject to disclosure, as provided in G.L. c. 66 section 10.

9. The chairman of the Commission may appoint from among its members, one (1) or more subcommittees to assist the Commission in carrying out any of its purposes. Efforts shall be made to assure that subcommittees reflect representation from the three (3) member Towns, wherever feasible and appropriate.

10. Upon receipt of a Level Two Development Permit application, the Commission shall send one (1) copy each of such application and completed plan submission package to the boards of selectmen and planning boards of each of the Towns. The selectmen and planning boards shall be invited to attend and offer testimony at any public hearings scheduled by the Commission to consider a Level Two Development Permit application. Within thirty (30) days of receipt of a Level Two Development Permit application, the selectmen and the planning boards may submit to the Commission their written comments concerning the proposed project, accompanied by a listing of their concerns and issues regarding the application.

11. The Commission shall notify all abutters to a proposed development project as to the time and place of any Commission meeting or public hearing scheduled to consider a Level Two Development Permit application. Abutters shall be defined as all real property owners whose property lies within three hundred (300) feet of any property line of the development site.

12. Town officials other than the boards of selectmen and planning boards may also attend, offer testimony, and provide the Commission with correspondence regarding any Level Two Development Permit application. Similarly, any private citizen may submit written or oral testimony to the Commission regarding a Level Two Development Permit application.

13. The Commission shall not terminate the public hearing on either an application for a Level Two Development Permit or an application for a variance until thirty (30) days have expired since the receipt of either such completed application. The Commission, with the consent of the applicant, may agree to an extension of the public hearing period of up to thirty (30) additional days. The Commission shall render its decision on an application for a Level Two Development Permit or an application for a variance within thirty (30) days after the termination of the public hearing.

14. The Commission, the Land Bank and the boards of selectmen of the towns of Ayer, Harvard and Shirley, with the advice of the planning boards of said towns, on or about July 1, 2000, and every five (5) years thereafter (or prior thereto, with the consent of all parties named above, upon the occurrence of special circumstances), shall conduct progress reviews of the status of the redevelopment effort at Devens, which reviews shall include, without limitation, assessments of employment base, employment income, land resources expended, land costs, infrastructure implementation and investment, including an assessment of future investments needed and the timing thereof, other costs, tax base, superfund clean-up issues, traffic and other impacts both internal and external to Devens. These progress reviews shall be summarized in a written report, and are intended to offer to all participating parties a long term overview and perspective for assessing progress to date, lessons learned and adjustments that may be needed.

B. **Powers and Responsibilities of the Commission**

1. As provided in the Act, the Commission shall develop and adopt the Regulations by July 14, 1995, provided, however, that the Commission shall adopt the portion of the Regulations establishing reasonable performance standards for lighting, noise, odors, vibration, electrical disturbance, emissions, buffers and similar environmental considerations, hereinafter the "performance standards," by the earlier of May 1, 1995, or the date of the issuance by the Department of the Army of the Record of Decision for the Fort Devens Environmental Impact Statement. The portion of the performance standards relating to the effects of lighting, noise, odors, vibration, electrical disturbance on areas outside of the boundaries of Devens shall be prepared by the Commission, with the assistance of Land Bank staff, and shall be submitted to the Joint Boards of Selectmen of the Towns and the Board of Directors of the Land Bank for review and approval, which approval shall not be unreasonably withheld or delayed. Approval by the Joint Boards of Selectmen shall be by unanimous vote. This portion of the performance standards shall not be effective until such time as they are approved by the Joint Boards of Selectmen and the Land Bank, as provided above.

2. The Commission shall ensure that development and use of land at Devens is carried out in compliance with the Act, the Reuse Plan, the By-Laws, and the Regulations.

3. The Commission shall administer and enforce the Reuse Plan, By-Laws, and Regulations within the boundaries of the Devens Regional Enterprise Zone. Areas outside these boundaries shall remain entirely within the jurisdiction of the Towns and shall continue to be administered by officials of the Towns in accordance with the municipal laws and regulations applicable to the Towns.

4. The Commission shall have the powers conferred upon it by section 11 of the Act and the By-Laws.

C. **Commission's Enforcement Powers**

1. In accordance with section 11 of the Act, the Commission is obligated to administer and enforce the Reuse Plan, By-Laws, and Regulations.

2. The Commission shall enforce the Reuse Plan, By-Laws, and Regulations by exercising the enforcement powers granted to the Commission pursuant to section 11 of the Act:

    a. the power to withhold building and occupancy permits;

b. the power to assess penalties for violation of the Reuse Plan, By-Laws, or Regulations in amounts no more than three hundred dollars ($300.00) per day, per violation, provided that each day such violation continues shall constitute a separate offense;

c. the power to institute actions in Court to compel the removal, alteration, or relocation of any structure that violates the Reuse Plan, By-Laws, or Regulations;

d. the other enforcement powers available to the Commission, pursuant to G.L. c. 40 A section 7;

e. the enforcement powers available to a zoning board of appeals, pursuant to G.L. c. 40 A section 14;

f. the power to require security for the construction of ways and municipal services to a subdivision, as provided in G.L. c. 41 section 81 U;

g. the powers available to enforce the subdivision-control sections of the By-Laws and Regulations, as provided in G.L. c. 41 sections 81 K-81GG;

h. the powers available to the Commission to enforce the Historic District Acts, as provided in G.L. c. 40 C;

i. the powers provided to the Commission to make and enforce reasonable public health regulations, as provided in G.L. c. 111 sections 31 through 31 F, including, but not limited to, the issuance of permits and the assessment of fines related to the violation of the By-Laws and Regulations, including the removal and transport of garbage or other offensive substances, atmospheric pollution, disposal of cesspool and septic-tank waste, and the construction, maintenance, and alteration of certain sewage disposal systems; and

j. the other powers expressly and impliedly conferred upon the Commission pursuant to the Act, provided, however, that nothing in the By-Laws shall purport to limit the right of a state agency to exercise its statutory right to review the action of the Commission, whether in the areas of wetlands protection, preservation of historic buildings, or in other areas required by law.

3. Except as otherwise provided to the contrary in the Act, the Commission shall establish in the Regulations specific procedures and controls necessary to regulate the municipal powers enumerated in G.L. c. 40 section 21, and such Regulations shall include enforcement provisions, including the assessment of fines and penalties, for breach of such Regulations, provided that such fines shall be recovered by criminal or noncriminal dispositions, as provided in G.L. c. 40 section 21 D.

4. The Commission shall enforce the provisions of the "Wetlands Protection Act," G.L. c. 131 section 40 and regulations promulgated thereunder, in the same manner and to the same extent as a local conservation commission, and in so doing may issue orders directing compliance with said section 40 and may undertake other enforcement actions authorized by law.

5. The Commission or the Land Use Administrator shall withhold issuing a building, occupancy, or Development Permit for the construction, alteration, or moving of any building or structure if the building or structure, as constructed, altered, or moved, would be in violation of the Reuse Plan, By-Laws, or Regulations.

6. No permit shall be granted by the Commission or the Land Use Administrator for a new use of a building, structure, or land which use would be in violation of the Reuse Plan, By-Laws, or the Regulations.

7. If the Commission is requested in writing to enforce the Reuse Plan, By-Laws, or the Regulations against any person allegedly in violation of same and the Commission declines to act on such request, the Commission shall notify the party requesting such enforcement of any refusal to act and the reasons therefor, in writing, within fourteen (14) days of receipt of such request.

8. The Commission may commence an action in Superior Court to compel enforcement of its actions or orders relating to matters within the Commission's jurisdiction, pursuant to the Act, the Reuse Plan, By-Laws, or the Regulations.

D. **Commission's Public Safety and Public Health Obligations**

1. The Commission shall establish in the Regulations the standards and procedures through which it will carry out its obligations under section 22 of the Act to conduct inspections and enforce the provisions of the state building code, wire code, plumbing and gas code, sanitary code, fire code, and the code regulating the operation of elevators.

2. The Commission shall likewise establish in the Regulations the standards and procedures through which it will carry out its obligations under section 22 of the Act to conduct inspections and protect the public health in Devens.

3. The Commission shall establish in the Regulations reasonable fees for permitting and carrying out inspections related to enforcing its obligations under the foregoing paragraphs 1 and 2, and shall assess fines for the violation of the public safety and public health standards described in the Regulations.

4. In order to carry out its obligations to administer and enforce the public safety and public health standards contained in the General Laws and the Regulations, the Commission may adopt any one or a combination of the following administrative options:

   a. establishment of a department of inspections under the direct control of the Commission;

   b. contracting for inspection services, provided that the Commission will retain the responsibility for the contractor's actions; or

   c. designation of the division of public safety as the public agency that will oversee the issuance of permits related to public safety issues and perform related inspections, and designation of the department of public health as the public agency that will oversee the issuance of permits related to public health issues and perform related inspections.

E. **Land Use Administrator, Staff, Consultants**

1. The Commission shall appoint a Land Use Administrator to promote the efficient administration of the Act, the Reuse Plan, the By-Laws, and the Regulations. Such Administrator shall have substantial professional experience involving planning, land use control, and development issues. The Administrator may assist the Commission in the review and evaluation of applications for development permits and licenses authorized under the By-Laws and Regulations and may have other obligations as provided herein. The Commission may employ other staff, including a full or part-time environmental compliance officer with substantial credentials in environmental science or related subjects, and consultants to assist in carrying out its duties.

2. The Commission may, by regulation and with such conditions as it deems appropriate, delegate to the Land Use Administrator the Commission's responsibilities for administering and enforcing the By-Laws, including the power to issue building, occupancy, and other permits and licenses.

3. The Commission may, by regulation and with such conditions as it deems appropriate, delegate to the Land Use Administrator the power to execute any documents on behalf of the Commission, for the purposes of acknowledging or endorsing on such documents the Commission's prior approval of the information contained on such documents.

4. Any person, Town official, or Town board may appeal any determination of the Land Use Administrator to the full Commission, as set forth in Article IV sections C, D, or E.

ARTICLE III. PERMITTING PROCEDURES

A. **General Provisions**

The Commission shall adopt in the Regulations, rules, and standards consistent with the By-Laws and the Act to ensure the orderly review, issuance, and enforcement of development permits for the construction upon or use of land within Devens.

B. **Event Permit**

1. The Commission may grant an event permit to authorize a short-term activity within Devens, for an event not to exceed fourteen (14) consecutive days in length, such as participatory sports, family entertainment, outdoor markets, concerts, and special events.

2. The Commission shall establish in the Regulations requirements for the granting of an event permit. Any application for an event permit shall include information relating to the potential impact that such event will have on traffic, sensitive environmental resources, public health, and public safety issues within Devens and the Towns. Prior to the issuance of an event permit, the Commission shall consult with both the selectmen and the police chief of the Town in which the event is to be held.

3. An event permit shall not be deemed necessary if a property owner or business intends to hold a one (1) day promotional event on its land within Devens.

C. **Development Permit**

1. The Commission shall develop a single development permit application form and procedure to provide for the issuance of a unified development permit, hereinafter a "Development Permit," which will include provisions for all the land use approvals required by an applicant to develop land at Devens. Upon approval of a unified Development Permit application, the applicant shall be issued a single Development Permit by the Commission. The application form and procedure for such permit shall incorporate all aspects of any permits or licenses required by an applicant to develop land at Devens, including the subdivision of land, the issuance of building and occupancy permits, zoning approval, site plan review, determination of applicability or an order of conditions under the Massachusetts Wetlands Act, design approval in designated historic districts, public health permits, and any other permits or licenses within the authority of the Commission. The Commission shall hold concurrent public hearings whenever feasible to consider the various aspects of a development application. Upon approval of such application, the applicant shall be issued a single Development Permit by the Commission.

D. **Levels of Review**

1. In order to administer the development permitting process in a manner that will ensure an appropriate level of evaluation and review consistent with the scope and complexity of each proposed project, there shall be at least two levels of application review, consisting of one level, hereinafter "Level One," for relatively simple submissions, as further described hereafter, and a second level, hereinafter "Level Two," for more complicated or higher impact submissions.

2. An application for a Development Permit shall be deemed Level One in the following cases:

   a. issuance of building or occupancy permit, wherein no other Commission action or site plan review is required;

   b. issuance of a permit for alteration or creation of a lot for any of the following purposes: revision of lot lines, division of a lot containing two (2) buildings into two (2) lots with separate buildings, and division of a single lot unimproved by a building into two (2) or more smaller lots; provided, however, that in any event all resultant lots shall comply with the frontage requirements in Article VIII and said frontage shall be on a way which the Commission certifies is used and maintained as a public way;

   c. approval of minor modifications to an already approved site plan consistent in scope with the following examples: a change to a more desirable variety of landscape material; a shift of less than eight (8) feet in building placement on the lot, for siting reasons; a shift in site utility connections, in order to provide

improved hookup to the public system or to avoid a natural constraint; an adjustment of not more than three (3) feet in the width or location of a driveway entrance, in order to improve sight distance or to avoid a natural constraint; and similar adjustments required to facilitate a more functional site plan;

d. approval of minor architectural modifications of a structure within an historic district consistent in scope with the following examples: movement of less than six (6) inches in an approved window or door opening; modifications of less than two (2) total inches on an approved shutter or removable facade feature; shifts of less than one (1) foot of a staircase or existing canopy; modifications to approved signs involving less than ten (10) percent of the sign area; or reasonable modifications to sign placement for practical reasons;

e. issuance of a certificate of compliance under an order of conditions.

3. An application for a Development Permit shall be deemed Level Two in all other circumstances.

4. In accordance with the guidelines provided in the foregoing paragraphs 2 and 2, the determination as to whether a particular application should be classified as a Level One or a Level Two application shall initially be made by the Land Use Administrator and any challenge to that determination shall be determined by the Commission pursuant to Article II F 4.

E. **Contents and Procedure Applicable to a Development Permit Application**

1. The Commission shall establish and adopt in the Regulations requirements for the submittal and review of Development Permits, which shall be consistent with the By-Laws and made available to the general public.

2. A Level One Development Permit may be approved by the Land Use Administrator. Within seven (7) days after the submittal of a Level One Development Permit application, the Land Use Administrator shall determine whether the Level One Development Permit application package is complete. If the Land Use Administrator fails to make such determination within the seven (7) day review period, the application shall be deemed complete. If a Level One Development Permit application is deemed incomplete, the Land Use Administrator shall, in writing, inform the applicant of the deficiencies in the application. Within twenty-one (21) calendar days of the Land Use Administrator's determination that an application is complete, a Level One Development Permit shall be issued or denied unless the applicant requests and the Land Use Administrator approves an extension of the twenty-one (21) calendar day period. The Land Use Administrator may request the applicant to approve an extension of the twenty-one (21) day review period. The Land Use Administrator shall furnish the Commission with a written summary of Level One Development Permits issued each month.

3. A Level Two Development Permit may be approved by the Commission, subject to the following procedures:

a. The applicant shall participate in a mandatory pre-permitting conference with the Land Use Administrator and staff for the purposes of discussing the scope of the application, determining specific submission requirements, and defining the precise types of submissions required. The purpose is to provide for a simple and uniform procedure for exchanging basic information between the applicant and the Land Use Administrator.

b. Within fourteen (14) days after the submittal of a Level Two Development Permit application, the Land Use Administrator shall determine whether the Level Two Development Permit application package is complete and in compliance with the By-Laws and Regulations. If deemed complete, the Level Two Development Permit application shall be approved as to form and the application package shall be forwarded to the Commission for full review and consideration at a public hearing. If the Land Use Administrator fails to make such determination within the fourteen (14) day review period, the application shall be deemed complete.

c. If a Level Two Development Permit application is deemed incomplete, the Land Use Administrator shall, in writing, inform the applicant of the deficiencies in the application. The Land Use Administrator may, however, permit an application to move forward to the Commission for the commencement of the public hearing process, notwithstanding missing elements in the application package, provided they are submitted by a stipulated date.

d. Whenever the Commission determines that a proposed project presents special environmental considerations that have not been adequately addressed in the standard submissions by an applicant, the Commission may require the submission of additional technical or scientific data addressing those special environmental considerations, particularly those related to the protection of water resources described in Article X. The Commission may also request such data in regard to the quantity and nature of site-generated vehicular traffic (associated with the proposed development), if it deems that data provided under normal submission requirements is insufficient. If additional data is requested under this provision, the Commission shall establish reasonable time limits for the submission and review of such data, so as not to unnecessarily delay the application review process.

e. In no case shall a Level Two Development Permit be approved by the Commission until the application is complete and all requirements met, provided that submission by the applicant of information required for the issuance of the building permit portion of a Development Permit shall not be required until such time as the applicant has completed site plan review and the project is ready to proceed into construction.

f. A Level Two Development Permit may, upon the request of the applicant, be approved by the Commission to authorize the planning and development of land on a phased basis.

4. As provided in Article II A, the Commission's meetings and public hearings shall follow statutory requirements for public notice and open meetings. Mandatory time limits for the Commission's review and hearing process shall be established in the Regulations.

5. The Commission shall include in the Regulations a schedule showing the period of time that approvals of various components of a Development Permit shall remain valid.

F. **Innovative Development Options for Level Two Development Proposals**

1. The Commission shall develop procedures in the Regulations that will be designed to encourage developers to propose projects that will utilize innovative development strategies, including, but not limited to, clustered development, condominium development, and planned unit development methods.

2. The Commission may approve zero (0) lot line requirements, and other relief from the dimensional requirements of these By-Laws, as part of its review and approval of such innovative development strategies.

3. In the Regulations, the Commission may establish special frontage, set back requirements, and other requirements that will apply to such innovative development proposals. Those requirements shall differentiate between developments that exceed twenty-five (25) acres in size ("Large Lot Developments") and developments that are less than twenty-five (25) acres in size ("Small Lot Developments").

4. Submission Requirements:

a. Applicants proposing both Large Lot Developments and Small Lot Developments shall be encouraged to employ innovative site design and clustering techniques.

b. Small Lot Developments should be designed in a manner that shows sensitivity to existing conditions and to the concerns of adjacent users. Proposers of small Lot Developments shall be required to submit information concerning the proximity of proposed buildings to adjacent lot lines; nature and extent of existing or proposed perimeter buffers on the lot and screening areas, as well as landscape plans; building elevation drawings; the location of loading areas and site access; and other representations involving visual impact on abutting users.

5. The Commission may grant a Level Two Development Permit for projects that utilize innovative development approaches if it finds that the applicant has demonstrated the following:

a. the development plan provides for uses permitted within the zoning district

b. the development plan will be designed with due consideration for health and safety issues;

c. the development plan is superior to a conventional plan providing for the construction of one (1) building on one (1) lot, in the way it preserves open space, minimizes environmental disruption, and

allows for more efficient provision of services to the businesses and residents of the development than would be available under a conventional approach; and

d. the development approach generally conforms to the density, height, and other dimensional requirements of the By-Laws and the Regulations, although necessary deviations from those requirements, not including height standards and requirements set forth in Article IX C or in Exhibit B, may be considered by the Commission.

G. **Reuse of Existing Buildings**

1. General Purpose and District Applicability

It is the intent of the Reuse Plan and By-Laws to encourage the reuse of many of the existing buildings for new occupants of various sizes, whether the business is established, an incubator, or a start-up venture. If the business involves full or partial use of a building as is, without any site modifications, then the occupancy is subject only to obtaining an occupancy permit and a building permit if there is interior reconstruction. This applies whether the building is leased or owned by the applicant. Expansion of a building or site modifications other than signage or the voluntary addition of landscaping will require a submission of a full Level Two Development Permit application.

2. Permitted Development Options for Existing Buildings

In addition to reusing buildings, an applicant may employ any of the following development options in such locations, and/or any combinations thereof:

a. demolition of buildings;

b. construction of physical connections between buildings (provided that major vehicular or pedestrian access is not removed in doing so)

c. construction of new buildings;

d. expansion (vertically or horizontally) of existing buildings; and

e. construction of accessory structures for any necessary and reasonable accessory uses related to business operations.

Any action other than reuse of existing building space shall require submission of a Level Two Development Permit application.

3. Minimum Frontage Requirements

When a proposed development consists of existing buildings, a minimum lot frontage of seventy-five (75) feet on a street within Devens shall be required.

H. **Site Plan Review**

1. General

a. Site plan review, as a part of or as a sole component of a Level Two Development Permit application, shall be triggered by one or more of the following circumstances:

(i) construction of any new building, regardless of land use;

(ii) extension or increase in the area of a nonconforming use in an existing building;

(iii) construction or expansion of a parking lot, structure, or loading dock;

(iv) construction of an ancillary building on-site (denoting use for storage of equipment, maintenance supplies, and similar items, or housing building systems equipment), if the building contains more than eight hundred (800) square feet of gross floor area; and/or

(v) construction of a project that will result in changes to the existing grade of ten (10) percent or more of the lot size.

b. The Commission shall establish in the Regulations the standards and criteria that will apply to the completion of a site plan for a proposed project. When a subdivision of property is involved, the site plan shall be combined with the subdivision plans as part of a unified Development Permit application. The Commission's site plan review shall be conducted in accordance with the standards set forth below and in the Regulations. The Commission may employ professional consultants or experts, including, without limitation, technicians, engineers, and/or architects for purposes of reviewing and evaluating, on behalf of the Commission, the information shown on a site plan and any information submitted in connection with a site plan.

c. Landscaping Standard. All varieties of trees and shrubs planted for new development shall be specified in a planting plan submitted as part of site plans for any new construction of buildings, parking lots, or any similar improvement. Where feasible, plant species selected shall be drought resistant, in order to conserve water used for irrigation, and non-invasive. Maximum use of indigenous species for the region or climate zone shall be encouraged, although planting of non-native trees and shrubs is acceptable for ornamentation in appropriate site locations.

2. Site Plan Requirements

The Regulations shall contain detailed requirements governing applications for site plan review, which shall include, but need not be limited to, the following:

a. the content of plans;

b. designation of proposed building locations;

c. location and design characteristics of proposed roads, driveways, and parking areas;

d. existing and proposed site grades;

e. identification of wetlands affected by or adjoining the proposed project;

f. utility service to the proposed project and drainage plans and calculations;

g. traffic studies relating to the proposed project; and

h. screening plans for the proposed project.

I. Fees and Fines

The Commission shall establish in the Regulations a fee structure, including, but not limited to, fees for plan review, project review, and subdivision review, and may require applicants to provide bonds and other appropriate forms of security to ensure the successful completion of projects. The Commission shall also, in the Regulations, establish a system of fines to address cases of noncompliance with the subdivision and site plan provisions of the By-Laws and the Regulations.

J. Visual Impact of Buildings in Viewsheds

1. When a Development application proposes the construction of one (1) or more buildings within areas of Devens that will be located in areas that have high visibility from areas outside of Devens, as determined by the Commission, which areas shall include, without limitation, Prospect Hill in Harvard at the Sears Estate (Prospect Hill overlook) and the Fruitlands Museum parking lot. Eased on the viewshed analyses, the Commission may require that the exterior design of such buildings and related sitework meet the following standards:

a. use of building materials and colors on the building facade that are darker than natural concrete or shades of white or that are earth tone in color; and

b. use of mature tree plantings of four (4) to six (6) inch caliper or larger, depending upon the natural growth rate and crown massing of the species selected, to help screen and soften the visual impact of the height of buildings whose facade will be visible in a viewshed; and

c. tree removal (of trees larger than four [4] inch caliper) shall be minimized where such removal would have a materially adverse effect on the viewshed.

2. The Commission may also require applicants for a Development Permit to consider alternatives relating to the shape and massing of a building to further lessen the impact of the visibility of such building when located within a viewshed.

3. Any sign proposed to be placed within a viewshed area shall be situated in a location where it will be below existing or new tree canopies, in order to result in its minimum visibility in the viewshed area.

K. **Earth Removal Permit**

1. Level Two Development Permit

a. Except as provided in paragraph 4 of this section, no soil, loam, sand, gravel, or other earth materials shall be permanently removed from any lot within Devens, except in accordance with an approved Level Two Development Permit.

b. A Level Two Development Permit for removal of earth materials shall only be granted if the Commission finds that operations to be conducted under such permit will not:

(i) be injurious or dangerous to the public health or safety;

(ii) produce noise, dust, or other effects observable from adjacent property in amounts objectionable or detrimental to the normal use of adjacent property;

(iii) result in use of streets so as to cause congestion or hazardous conditions

(iv) result in the change in topography and cover which will be disadvantageous to the most appropriate use of the land on which the operation is conducted;

(v) have a material adverse effect on the water supply, health, or safety of persons or businesses in Devens or the Towns; or

(vi) have a material adverse effect on areas that have high visibility from areas outside of Devens, as determined by the Commission pursuant to Section J of this Article.

2. Application for Earth Removal Permit

a. Each application for a Level Two Development permit for earth material removal shall be accompanied by a plan, submitted in triplicate, showing::

(i) the existing contours of the land;

(ii) the contours as proposed after completion of the operation;

(iii) the proposed lateral support to all adjacent property;

(iv) the proposed drainage, including calculations;

(v) other information necessary to indicate the complete physical characteristics of the proposed operation.

3. Conditions of Permit

   a. In granting a Level Two Development Permit for earth removal, the Commission shall impose reasonable conditions specially designed to safeguard the persons, businesses, and land within Devens and the Towns, which may include conditions as to:

      (i) method of removal;

      (ii) type and location of temporary structures;

      (iii) hours of operation;

      (iv) routes for transporting the material through Devens and the Towns;

      (v) area and depth of excavation;

      (vi) distance of excavation to street and lot lines;

      (vii) steepness of slopes excavated;

      (viii) re-establishment of ground levels and grades;

      (ix) provisions for temporary and permanent drainage;

      (x) disposition of boulders and tree stumps;

      (xi) replacement of loam over the area of removal;

      (xii) planting of the area to suitable cover, including shrubs and trees; and

      (xiii) cleaning, repair, and/or resurfacing of streets used in removal activities which have been adversely affected by the removal activity.

   b. No earth removal permit shall be issued for a period of more than three (3) years, although such a permit may be renewed for additional periods not to exceed three (3) additional years.

   c. The Commission shall require a performance guarantee in a form it deems appropriate to insure compliance with its conditions of authorization.

4. Exemptions

   The removal of earth material in any of the following operations shall be exempt from the requirements of this section:

   a. the removal of less than ten (10) cubic yards of material in the aggregate in any year from any one (1) lot;

   b. the transfer of material from one (1) part of a lot to another part of the same lot;

   c. the removal of material necessarily excavated in connection with the lawful construction of a building, structure, or street, or of a driveway, way, sidewalk, path, utilities, or other appurtenance incidental to any such building, structure or street; and

   d. the removal of material necessarily excavated in connection with the environmental clean-up of a site and/or the remediation of such material, in accordance with applicable law.

5. The Commission may include in the Regulations further restrictions and procedures relating to the issuance of an earth removal permit.

ARTICLE VIII. SUBDIVISIONS

A. **General**

No person may subdivide land except in accordance with the provisions of the By-Laws and the Regulations. In particular, no person may subdivide land unless and until a final plan of the subdivision has been approved by the Commission, in accordance with the By-Laws and the Regulations. Requests to subdivide land shall be submitted as part of an application for a Development Permit.

B. **Subdivision Regulations**

1. The Commission shall include in the Regulations provisions regulating the development of subdivisions. The Regulations shall include provisions relating to submission requirements, application and plan review fees, inspection fees, and performance guarantees. The Regulations shall also establish standards with respect to the following:

   a. the location, quality of construction, width, and grades of streets and roads in the proposed subdivision;

   b. the utilities and local services that may be required to service the subdivision;

   c. the relationship of new streets, lots, and buildings to one another and to the surrounding property;

   d. building placement where property with an existing building(s) is being subdivided;

   e. building setback requirements and frontage;

   f. limitations on the type, height, and placement of vegetation; and

   g. restrictive covenants protecting solar access.

2. All Commission hearings to consider a proposed subdivision plan shall be subject to the public hearing and notice requirements described in Article II of the By-Laws.

3. Development of a subdivision may only proceed in accordance with an approved subdivision plan, the requirements for which will be contained in the Regulations. When a proposed subdivision will have an effect on parking, the subdivision submission shall include information that meets the parking requirements of the By-Laws and Regulations.

4. An approved subdivision plan shall not be changed without the approval of the Commission.

5. A person may submit a Level One Development Permit application that is limited to a request to subdivide land, as provided in Article III D. Future proposed land use and development actions at the subdivided property shall be subject to the submission of a Level Two Development Permit application.

6. Frontage

   a. When a proposed subdivision will be based upon entirely new construction, a minimum lot frontage of one hundred (100) feet on a street shall be required.

   b. When a proposed subdivision will involve the use of existing buildings, which may also involve new construction, a minimum lot frontage of seventy-five (75) feet on a street shall be required.

7. The provisions of the By-Laws and the Regulations relating to subdivision of land shall not prohibit one person's subdividing land for the purposes of providing adjoining land with sufficient land area to meet the subdivision requirements of the By-Laws and Regulations, provided that the configuration of both lots resulting from such subdivision comply with the requirements of the By-Laws and the subdivision regulations.

ARTICLE XI. WATER RESOURCES PROTECTION REQUIREMENTS

A. Objectives

The objectives of the Water Resources Protection Overlay District (the "WRP") are:

1. to promote the health, safety, and general welfare of the community by ensuring an appropriate level of protection for all water resources within Devens in recognition of the importance of this resource to the region;

2. to preserve the high quality of surface and ground water in the aquifer underlying the Devens area (the "Aquifer") in order to ensure its future use;

3. to conserve natural resources wherever possible;

4. to promote statewide goals for surface water quality in the Nashua River Basin; and

5. to prevent the temporary or permanent contamination of soils, surface water, and ground water on Devens;

   while allowing economic development in an environmentally responsible manner.

   Consistent with these objectives, the WRP provides requirements which will afford the protection of water resources within Devens, as recommended by the Water Resources Protection Plan.

B. General Guidelines

1. The WRP is an overlay district superimposed on all zoning districts. The WRP shall apply to all new construction, reconstruction, or expansion of existing buildings and new or expanded uses. Applicable activities or uses which fall within the WRP must comply with the requirements of this district, as well as underlying zoning. Uses that are prohibited in the underlying zoning districts shall not be permitted in the WRP.

2. Devens is hereby divided into four (4) water resource protection districts ("WRP Districts"), over which differing levels of water resource protection shall be applied. The WRP Districts shall be delineated as overlays on the Zoning Map. The best available information has been used to establish the interim delineation of the four (4) districts. As more definitive information is obtained indicating that the boundaries of any of the districts should be modified, the Commission shall, from time to time and after public hearing, alter those boundaries to reflect the more definitive information. The four WRP Districts are comprised of the following areas:

   a. Zone I Zone I areas, as defined by 310 CMR 22.02.

   b. Zone II Zone II areas, as defined by 310 CMR 22.02.

   c. Aquifer District Aquifer Districts are areas over the Aquifer which are outside of Zones I and II.

   d. Watershed District Watershed Districts are the remaining areas of Devens outside the Aquifer District, Zone I, and Zone II.

3. The Commission shall further establish in the Regulations detailed protective measures for the WRP Districts, which shall be consistent with the general guidelines provided in this Article.

4. The Commission shall establish varying levels of protection for each WRP District based on its level of sensitivity, with the highest levels of control established for Zone I and Zone II and lesser levels of control in the Aquifer District and Watershed Districts.

5. Each Level Two development proposal shall include all the information required under the WRP. Level One development proposals and other land use activities at Devens not requiring the submission of a development proposal application shall also meet the applicable requirements of this Article.

6. All proposed land uses and activities at Devens shall be consistent with the WRP and all applicable federal, state, and local regulations applying to water resource protection.

C. **Rail, Industrial, Trade-Related Zoning District**

The Rail, Industrial, Trade-Related zoning district (the "District") is delineated on the Zoning Map. Given the rail and truck-related activity designated for the District, which overlies a portion of the Aquifer and the northern portion of which is adjacent to Plow Shop Pond and Grove Pond, for all proposed development within this District additional controls and design measures will be required to assure the protection of existing water resources within the District. These control and design measures will allow the operation of rail/industrial and trade-related businesses in the Aquifer district and in certain Zone II areas, while providing protection to water resources within the District. Furthermore, the Commission shall include in the Regulations the following controls and design measures to assure the protection of existing water resources within the District:

1. a predesigned common system for stormwater treatment, management, maintenance, and control to be phased-in in advance of sites as they are developed;

2. prohibition of on-site disposal of hazardous wastes;

3. provide for the detention and recharge for pavement and roof runoff;

4. peak rates of runoff to be held at or below current rates; and

5. a stormwater system designed to intercept and isolate potential spills and provide for timely clean-up.

All uses in the District shall comply with the requirements of the WRP contained herein, with the exception that generators of hazardous waste beyond the level of Very Small Quantity Generators, as defined in 310 CMR 30.353, shall be allowed throughout the District.

D. **General Design/Planning Provisions**

1. Best management Practices ("BMPs")

The Regulations shall contain BMPs for the construction and operation of all buildings and facilities within the various zoning districts established in Devens that will involve activities regulated under the WRP. The BMPs shall include, but not be limited to, the following:

a. a standard Devens Spill Prevention Control and Countermeasure Plan (DSPCC) will be prepared by the Commission to facilitate implementation by users;

b. a prototype Integrated Pest Management Program (IPMP) will be prepared by the Commission to facilitate implementation by users who apply herbicides or pesticides to land areas greater than one (1) acre;

c. the establishment, where applicable, of ambient water quality conditions through groundwater monitoring;

d. public education programs for business and industries to promote practices which will protect water resources;

e. the periodic collection of household hazardous waste;

f. safeguards for loading areas for both rail and new facilities to ensure the safe transfer of goods and commodities; and

g. motorized off-road recreational vehicles will be prohibited in all conservation areas identified in the open Space Plan, as said Plan is defined in the Reuse Plan.

2. Construction Requirements

   The Regulations shall contain specific requirements for construction projects undertaken pursuant to Level One and Level Two Development Permits, where applicable to activities being undertaken under those Permits. The requirements shall include the following:

   a. submission of a site-specific erosion and sedimentation control plan and stormwater pollution prevention plan;

   b. designation of certain areas for machinery maintenance and refueling;

   c. designation of areas for construction debris containment and temporary storage; and

   d. construction planning to use pre-existing disturbed sites and minimize new site clearing and disturbance.

3. Water Conservation Measures

   The Regulations shall contain measures designed to encourage water conservation within Devens, which shall include, but not be limited to, the following:

   a. increase efficiency of all users through the promotion of water conservation measures for business and residential users;

   b. provide public education on water conservation; and

   c. require water conserving plumbing fixtures consistent with the Massachusetts plumbing code.

4. Stormwater Management

   The Commission shall establish thresholds and standards in the Regulations, on a site-wide basis, for the following:

   a. prohibition of new stormwater outfalls to discharge directly into resource areas ("Resource Areas") regulated by the Wetlands Protection Act, G.L. 121 sections 40 and 40 A;

   b. removal of suspended solids prior to discharging into Resource Areas;

   c. limits on oil and grease discharge into Resource Areas;

   d. limits on site-wide post-development total runoff volume increase; and

   e. determination of the standard storm event upon which water quality and peak rates of runoff are evaluated.

   The Regulations shall contain stormwater control measures, differentiated on a WRP District by District basis. Within the WRP Districts, the following stormwater controls will be designed and implemented on a site specific basis, based on standard engineering practices, best professional judgment, and site specific design constraints. The stormwater control measures shall include, but not be limited to, the following:

   a. Watershed Districts

      Each Level Two development shall employ stormwater control measures to reduce peak rates of runoff to predevelopment conditions and to maintain or improve water quality. The stormwater control measures shall include:

      (i) catch basins with traps and sumps;

      (ii) oil/water separators;

      (iii) flood controls/runoff controls;

(iv) ground water recharge facilities, including vegetated swales;

(v) source reduction of sand and other debris on roads and in parking lots;

(vi) a plan for the ongoing maintenance of stormwater control facilities, including periodic inspection for compliance by qualified personnel at all facilities; and

(vii) plans and calculations shall be provided with development proposals.

b. Aquifer District

All Watershed District provisions apply in addition to, or as modified by, the following provisions, for each Level Two development:

(i) stormwater controls shall provide for the removal of suspended solids and the interception of spills.

(ii) stormwater recharge must be provided to maintain or exceed current levels of recharge.

(iii) runoff shall be directed away from sensitive surface water areas.

(iv) development proposals for previously developed sites must demonstrate that water quality is being maintained or improved.

c. Zone II

All Watershed District and Aquifer District provisions apply in addition to, or as modified by, the following provisions, for each Level Two development:

(i) filtration shall be provided for groundwater recharge areas.
(ii) development plans shall include where appropriate stormwater recharge areas to reduce or maintain total volume of runoff.

5. Storage and Application of Deicing Materials

While recognizing that the use of deicing agents is necessary during winter months, the Commission shall establish specific measures in the Regulations to reduce the adverse effects of such deicing agents, differentiated on a WRP District by District basis. These measures shall include the following:

a. Watershed Districts

(i) piles of sodium chloride (road salt) chemically treated abrasives and other chemicals used for the removal of ice and snow (collectively referred to as "deicing materials") on roads should be stored under cover on flat, impervious surfaces protected from runoff. Drainage controls should be in place to direct runoff away from deicing materials storage areas.

(ii) deicing materials shall be kept dry through proper storage.

(iii) outfit deicing material spreading equipment with calibrated deicing material delivery systems for optimal control of the deicing material application rate and calibrations shall be periodically checked to assure they are working properly.

(iv) reduced salt application rates shall be encouraged.

(v) the direct application of one hundred (100) percent road salt to parking areas shall be prohibited.

b. Aquifer District

All watershed District provisions shall apply in addition to, or as modified by, the following provisions:

(i) the use of deicing materials for roadways is not to exceed the low-salt application rate of one hundred fifty (150) pounds/lane mile.

(ii) the use of alternative deicing materials for parking areas shall be encouraged.

(iii) the direct application of one hundred (100) percent road salt to roads shall be prohibited.

(iv) the stockpiling and/or disposal of snow or ice containing deicing materials from outside the Aquifer District shall be prohibited.

c. Zone II

All watershed District and Aquifer District provisions apply. In addition, the stockpiling and/or disposal of snow or ice containing deicing materials from outside of Zone II's shall be prohibited.

E. Operational Activities

1. Transportation of Hazardous Materials and Waste

The transportation of hazardous materials and waste (as defined below) within Devens shall be in accordance with 49 U.S.C. c. 27 section 1801, G.L. c. 21 C, and 310 CMR 30.400. The following provisions shall be implemented in the Regulations:

a. Watershed Districts
(i) specific roadways within Devens will be designated as primary access for use by carriers to deliver or remove hazardous material or waste. These roadways shall include MacArthur, Sherman, Jackson, Patton, and Barnum Roads.

(ii) all roadways listed in subsection (i) will be clearly marked and designated to facilitate safe transport of hazardous materials and waste.

b. Aquifer District

All Watershed District provisions shall apply, in addition to, or as modified by, the following: as all designated primary routes are reconstructed, catch basins equipped to intercept floating product shall be installed and maintained.

c. Zone II

All Watershed and Aquifer District provisions apply. In addition, as all designated primary routes are reconstructed, spill interception and containment methods will be installed.

2. Hazardous Waste and Materials

The Regulations shall contain measures for the control of hazardous waste and materials, as said terms are defined by 42 U.S.C. sections 690l-6922i, G.L. c. 21 C, G.L. c. 21 E, and 310 CMR 40.00 ("Hazardous Waste and Materials"). The following provisions shall be implemented on a WRP District by District basis. These measures shall include the following:

a. Watershed Districts

(i) Applicable state and federal laws and regulations shall apply.

(ii) All hazardous wastes generated within Devens must be disposed of or recycled at a licensed hazardous waste disposal facility.

(iii) A registration and inspection program for Hazardous Waste and Materials shall be established.

b. Aquifer District

All Watershed District provisions apply in addition to, or as modified by, the following provisions for each development:

(i) Development Permits shall establish specific requirements for the storage of Hazardous Waste and Materials which shall remain in force as long as the use exists.

(ii) Additional requirements for the storage of Hazardous Waste and Materials may be established on an individual development basis.

(iii) Developments storing Hazardous Materials or generating Hazardous Waste beyond a specified amount as stated in the Regulations will be required to provide an addendum to the standard DSPCC which shall specify all the Hazardous Materials being stored at the development site by name, the intended use of the Hazardous Materials, and the storage area in which all such Materials are being stored.

(iv) Outdoor aboveground storage areas shall be covered wherever possible, and shall have a secondary containment system which includes an impermeable layer and a berm or dike to hold any spills or leaks, with capacity to hold one hundred ten (110) percent of the maximum volume stored.

(v) Storage and use of Hazardous Waste and Materials shall only be allowed as an accessory use.

c. Zone II

All Watershed District and Aquifer District provisions apply. In addition, any development requiring an addenda to the DSPCC shall provide on-site materials and equipment for spill response in accordance with its specific DSPCC.

3. Storage Tanks

The Regulations shall contain measures for the storage of fuel, combustible and flammable liquids, as defined by 42 U.S.C. section 6901-6922i, G.L. c. 148, and 527 CMR 9.00, differentiated on a WRP District by District basis. These measures shall include the following:

a. Watershed Districts

Applicable state and federal laws and regulations shall apply. In addition, aboveground and underground storage tanks shall be registered, as specified under the Regulations.

b. Aquifer District

All Watershed District provisions apply in addition to, or as modified by, the following provisions, for each development:

(i) All aboveground and underground storage tanks greater than two hundred fifty (250) gallons shall be individually listed in the Development Permit.

(ii) Developments storing fuel and combustible and flammable liquids beyond a specified amount, as shall be specified in the Regulations, will be required to provide an addendum to the standard DSPCC which shall specify all the types of fuel, combustible or flammable liquids being stored at the development site by name, the intended use of said fuel and flammable liquids, and the storage areas in which all said fuel and flammable liquids are being stored.

(iii) The use of underground storage tanks shall be discouraged except where standard engineering practices and best professional judgment determine that underground storage tanks present fewer risks than aboveground tanks.

c. Zone II

All Watershed District and Aquifer District provisions apply in addition to, or as modified by, the following provisions:

(i) Aboveground storage tanks shall have an impervious basin with a secondary containment capacity of one hundred ten (110) percent of the total volume.

(ii) Monitoring wells may be required both upgradient and downgradient for both aboveground and belowground storage tanks.

(iii) Developments requiring an addendum to the DSPCC, as specified above, shall provide materials and equipment for spill response to be located on-site in accordance with the DSPCC.

4. Radioactive Materials and Medical/Research Wastes

The Commission shall require in the Regulations the proper storage, transportation and handling of radioactive materials and medical/research wastes in accordance with 42 U.S.C. sections 2011-2296, G.L. c. 111 H and c. 94 B, and 105 CMR 120.00.

5. Floor Drains

The Regulations shall contain measures regulating floor drains in accordance with applicable state (310 CMR 27.00 underground injection control regulation) and federal laws and regulations.

6. Pesticides and Herbicides

The Regulations shall contain measures regulating the use of pesticides and herbicides in accordance with G.L. c. 128 section 64, 330 CMR 15.00, and applicable federal laws and regulations. The following measures shall be implemented on a WRP District by District basis:

a. Watershed Districts

(i) For all non-residential applications, chemicals stored on-site shall be registered.

(ii) Spray equipment shall be properly calibrated, maintained and inspected.

(iii) Indoor storage areas must be properly marked.

(iv) Buildings used for storage of pesticides and herbicides must have a spill collection system in place.

(v) Mixing areas for pesticides should be located away from floor drains, such that leaks or spills cannot enter floor drains. All indoor and outdoor mixing areas should be equipped with proper controls to prevent pesticides and herbicides from entering the wastewater or stormwater systems.

b. Aquifer District

All watershed District provisions apply. In addition, for each development, storage facilities shall be covered and shall have a secondary containment system, and the use of pesticides and herbicides contained in the state Pesticide Board Groundwater Protection List (GPL) shall be restricted.

c. Zone II

All Watershed District and Aquifer District provisions apply. In addition, for each development, an approved Pesticide Management Plan shall be required prior to applying any pesticide or herbicide on the GPL.

7. Fertilizers

For projects on sites of one (1) acre or more proposing the use of fertilizers, the amounts and application rates shall be specified by the Commission in the Regulations. Furthermore, the Commission shall request the user to:

a. use fertilizer alternatives where appropriate;

b. test soil annually to determine annual fertilizer needs;

c. use time-release fertilizers;

d. limit application of any type of fertilizer; and

e. establish a monitoring program for fertilizer application to sites that are ten (10) acres or greater.

ARTICLE XII. WETLANDS PROTECTION

A. **Objectives**

The primary objective of the wetlands protection requirements of the By-Laws is to maintain and enhance the conservation and protection of all natural resources present within Devens.

B. **General Provisions**

1. The Act requires the Commission to exercise all the powers of a conservation commission relating to the enforcement in Devens of the Wetlands Protection Act, G.L. c. 131, sections 40 and 40 A, and the regulations promulgated thereunder by the Department of Environmental Protection at 310 CMR 10. The Commission shall administer its powers relating to the protection of wetlands in accordance with the Wetlands Protection Act and regulations issued by the Department of Environmental Protection thereunder. Resource areas protected under the Wetlands Protection Act include freshwater wetlands, rivers, streams, ponds, and lakes.

2. The Commission shall include a wetlands protection section in the Regulations which will provide a detailed description of the procedures required to obtain a wetlands permit, as well as the enforcement powers of the Commission and the Department of Environmental Protection. This section of the Regulations shall be consistent with and based upon 310 CMR 10.

3. The submission by an applicant pursuant to this wetlands protection by-law for a project involving wetlands, and the review of that Notice of Intent, shall be incorporated into the unified permitting procedure for Devens described in the By-Laws, particularly in the permitting procedure, Article III.

C. **Specific Provisions**

1. Lands within one hundred (100) feet of wetland resources are presumed important to the protection of these resources because activities undertaken in close proximity to wetlands and other resources have a high likelihood of adverse impact upon the wetland or other resource, either immediately, as a consequence of construction, or over time, as a consequence of daily operation or existence of the activities. These adverse impacts from construction and use can include, without limitation, erosion, siltation, loss of groundwater recharge, poor water quality, and loss of wildlife habitat. To protect water quality, groundwater recharge, and wildlife habitat, no alteration of the natural vegetation or substrate may be undertaken within twenty-five (25) feet of the bank of any stream, river, pond, any wetland bordering on these waterbodies, and any vernal pool certified by the Division of Fisheries and Wildlife (collectively "Resource Areas"). Furthermore, no building shall be located within fifty (50) feet of these Resource Areas.

2. Except for the twenty-five (25) foot and fifty (50) foot setbacks referenced in paragraph 1, the Commission may permit development within one hundred (100) feet of a Resource Area upon a demonstration by the applicant that work within the one hundred (100) foot area would not adversely affect the ability of the wetland to protect surface or groundwater, public or private water supplies, water quality, wildlife habitat, or fisheries.

3. The twenty-five (25) foot and fifty (50) foot setback requirements described in the preceding paragraph 1 will not apply to the construction of recreational facilities (bikeways, trails, docks, etc.), roads, streets, rail sidings, aboveground or underground public utilities and infrastructure, detention basins or drainage structures, measures undertaken for the remediation of contaminated soils or groundwater, or removal of solid waste.

DEVENS

Draft

Stormwater Pollution Prevention Plan

Prepared for:

The Joint Boards of Selectmen

- Town of Ayer
- Town of Harvard
- Town of Lancaster
- Town of Shirley

The Massachusetts Government Land Bank

Prepared by:

Vanasse Hangen Brustlin, Inc.

July 1995

STORMWATER POLLUTION PREVENTION PLAN

Ayer, Harvard, Lancaster and Shirley, Massachusetts

DRAFT

Prepared for: The Massachusetts Government Land Bank
Joint Boards of Selectmen

Prepared by: Vanasse Hangen Brustlin, Inc.
101 Walnut Street
P.O. Box 9151
Watertown, Massachusetts 02272

July 1995

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INTRODUCTION

This Stormwater Pollution Prevention Plan (SWPPP) is a guide for the Devens Enterprise Commission (DEC), for site developers, and site occupants at Devens to help meet the goal of preserving valuable environmental resources at Devens through responsible stormwater management.

The Devens Bylaws require that applications for Development Permits include a site-specific erosion and sedimentation control plan and a stormwater pollution prevention plan. This requirement recognizes that the wetlands and surface water bodies at Devens provide important functions and values that may be affected by changes in water quality and hydrology, and that the groundwater resources at Devens are important to public water supplies. The information provided in this document is intended to provide recommendations and guidance for the design and maintenance of stormwater management systems that protect wetlands and surface water resources by controlling the quality and quantity of surface runoff, and for the design of systems that protect ground water resources by maintaining or enhancing the quality and amount of water recharged to the subsurface aquifers.

Existing Conditions

The initial section of this plan provides an inventory and description of the sensitive surface and ground water resources at Devens, and provides an overview of the existing stormwater management infrastructure.

Construction and Operations

The sections of this plan which deal with stormwater pollution prevention during the construction and operations phases of site development provide guidance on measures and options that may be utilized to prevent erosion and sedimentation during construction activities, and information on the control of pollutants in stormwater discharges. These sections identify activities that may contribute to the quality of stormwater runoff; identify and discuss structural and non-structural Best Management Practices to prevent or control stormwater runoff pollution; and provide information on the monitoring of stormwater runoff to measure the effectiveness of controls and facilitate corrective actions.

Stormwater Pollution Prevention Plan

This section provides guidelines for the preparation of a Stormwater Pollution Prevention Plan (SWPPP) to be implemented during construction and/or operations of facilities at Devens. Step-by-step guidelines are presented for the

preparation of site-specific SWPPPs that will provide effective protection of surface and ground water resources for the redevelopment of existing sites, new construction in undeveloped areas, and roadway construction or reconstruction. Performance standards have also been developed for each type of construction, with modifications specified for each of the Water Resource Protection Districts. The goal of the performance standards and design criteria is to protect existing and future ground water supplies, wetlands, and surface water bodies, and where practicable reduce peak rates of runoff and improve water quality.

The guidelines in this document are intended to fulfill the requirements for Stormwater Pollution Prevention Plans under the EPA NPDES General Permit for Stormwater Discharges from Construction Activities. They exceed these NPDES requirements, by requiring the preparation of a SWPPP for all construction sites (rather than just sites larger than 5 acres). The Devens SWPPP also requires that all developed sites implement BMPs to protect water resources from potential adverse effects due to stormwater runoff from roadways and parking lots. This also exceeds NPDES requirements.

Industrial users of Devens must prepare a SWPPP for operations, whether users are undertaking new construction, are redeveloping an existing site, or are reusing an existing facility. This SWPPP is required by the EPA NPDES General Permit for Stormwater Discharges Associated with Industrial Activities. The Stormwater Pollution Prevention Plan section of this document provides an overview of the requirements for industrial facilities at Devens. However, since these SWPPPs must be individually prepared for each site and type of industrial user, it is not feasible to provide specific BMPs or performance standards in this document.

Rail Area Stormwater Plan

This section of the report outlines the purpose for developing a separate stormwater plan for the rail area, indicates sources of potential stormwater contaminants, provides a list of best management practices, and suggests guidelines for future plan development.

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EXISTING CONDITIONS

This section provides a description of the Main and North Posts at Devens including surface water features, cover, drainage basins, and the uses of existing development. Specific attention is given to the existing stormwater management infrastructure throughout the Main and North Posts.

GENERAL SITE DESCRIPTION

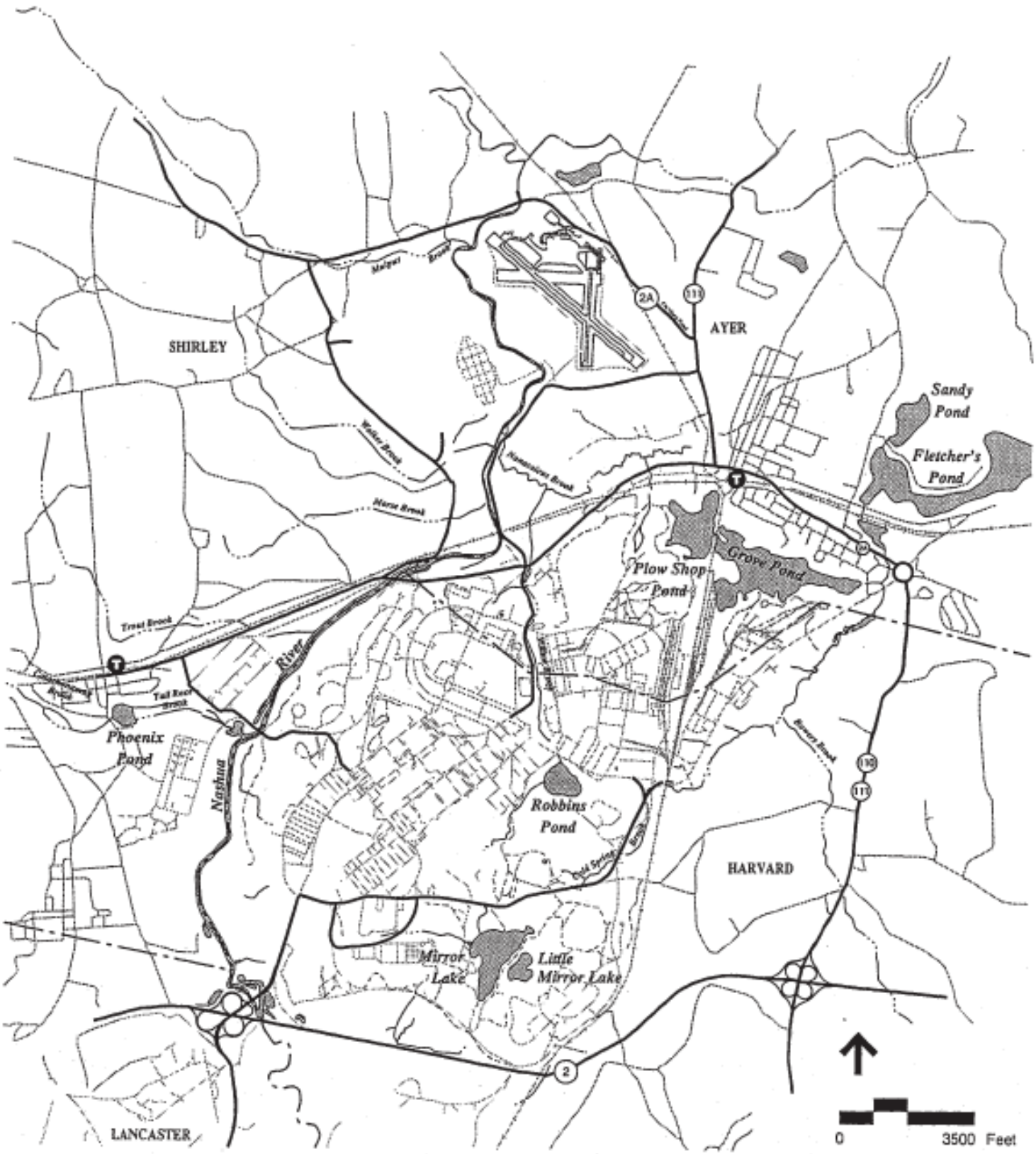
Devens is in the north central region of Massachusetts. It lies within Ayer and Shirley in Middlesex County, and Harvard and Lancaster in Worcester County. The site encompasses over 9,300 acres of land which have been extensively developed by the military. Devens is composed of three distinct areas, commonly referred to as the Main, North, and South Posts. Approximately 4,400 acres of the Main and North Posts are scheduled to be deactivated in 1995.

The North and Main Posts of Devens are functionally equivalent to a small city. Development includes residential neighborhoods, industrial/commercial areas (maintenance, administration, warehouse buildings), recreational facilities (golf course, riding stable, athletic fields, tennis courts), landfills, a wastewater treatment plan, and an airfield. Approximately 1/4 of the existing North and Main Post areas are undeveloped open space or recreational areas.

SURFACE WATER RESOURCES

The majority of the North and Main Post areas of Devens are within the watershed of the Nashua River, which flows northward along the western border of the Main Post and bisects the North Post between the airfield and the wastewater treatment plant (Figure 1). The Massachusetts DEP has classified the Nashua River as a Class B waterway, suitable for swimming and fishing. Despite recent improvements in water quality, excess levels of nutrients and biological oxygen demand frequently result in lower water quality and algal blooms in summer.

A portion of Devens is within a subwatershed draining to the Nashua River via Bowers Brook and Nonacoicus Brook. Major surface waters within this subwatershed include Robbins Pond, Grove Pond, Plow Shop Pond, and Willow Brook. Elevated levels of metals within Grove Pond and Plow Shop Pond have resulted in restrictions on fishing and other uses. Contamination has been found in Cold Spring Brook, presumably from leachate from an adjacent landfill.



DEVENS

Vanasse Hangen Brustlin, Inc.

Surface Water Resources

Figure 1

May 1995

Several ponds within Devens (Mirror Lake, Little Mirror Lake) are isolated kettle ponds which have no surface water inlet or outlet. These are vulnerable to degradation from surface water runoff, since no surface dilution or flushing occurs under natural conditions.

To protect water quality and ground water recharge functions of wetlands and surface waters, the Devens Bylaws prohibit any alteration of the natural vegetation or substrate within 25 feet of the bank of any surface waterbody, and within 25 feet of any wetland bordering on a surface water, except for the construction of recreational facilities, public utilities and infrastructure, and structures which convey or contain stormwater drainage.

GROUND WATER RESOURCES

Portions of Devens are underlain by relatively thick deposits of high-transmissivity glacial outwash materials, which create an aquifer. The eastern edge of the Main Post, and the majority of the North Post, overlay a high-yield aquifer. A medium-yield aquifer is present along the west edge of the Main Post, in the Nashua River basin, and along the outer edges of the high-yield aquifer.

These aquifers are important ground water resources for Devens and surrounding municipalities. Four drinking water wells within the Main and North Post areas supply Devens (Grove Pond, Patton, MacPherson, and Sheboken wells), and one well provides non-potable water for the golf course. Four additional wells within the aquifer supply Ayer and Shirley. Although Harvard does not currently utilize the Devens aquifer, future use is likely.

Water quality protection for these wells is of high importance during future re-use or development at Devens. Wellhead protection areas, either as 0.5-mile radius Interim Wellhead Protection Areas, or mapped and approved Zone II protection areas, have been designated for all of the wells listed above. However, the lack of a confining layer above the aquifer makes it vulnerable to contamination. Occasional trace levels of TCE in the Grove and MacPherson wells confirm that ground water contamination is possible unless stringent protective measures are taken.

The Devens Bylaws establish a Water Resources Protection Overlay District (WRP) intended to preserve the quality of surface and ground water in the aquifer underlying Devens. Four WPR Districts are defined:

- Zone I, areas within 400 feet of a drinking water supply well,
- Zone II, areas that directly contribute to a drinking water well (as defined at 310 CMR 22.02),
- Aquifer District, areas over the aquifer but outside of any mapped Zone I or Zone II, and
- Watershed District, defined as all remaining areas of Devens.

EXISTING STORMWATER MANAGEMENT INFRASTRUCTURE

The stormwater management infrastructure at the Main and North Posts of Devens consists of several decentralized systems of closed conduits and open channels, which generally discharge directly to surface waters and wetlands. Lack of system maintenance and poor system design (undersized pipes, poorly located inlets) contributes to flooding in several localized areas, particularly along Willow Brook.

The existing system contains few or no engineered means of controlling stormwater runoff rates or providing water quality enhancement. Catch basins, where these exist, provide some sediment trapping. Drainage pipes, due to their length and diameter, may restrict runoff rates. Open swales or channels provide a minimal level of filtration and infiltration of stormwater runoff prior to discharge to surface waters or wetlands. Generally, filtration, biological uptake, and biochemical degradation in on-site wetlands provides the majority of stormwater treatment and protection of existing surface waters.

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This section describes stormwater pollution prevention techniques which can be used during typical construction activities and should be applied by site developers at Devens. While these activities are typical, site-specific conditions will dictate how construction procedures will be implemented and how stormwater pollution prevention measures will be designed. Best management practices (BMPs) and mitigation measures which can be implemented are outlined in each section.

PURPOSE

The purpose of this guidance document is to help site developers develop and implement a Stormwater Pollution Prevention Plan (SWPPP) as required as part of the Water Resources Protection Plan, and to comply with the EPA NPDES General Permit for Stormwater Discharges Associated with Construction Activities. The purpose of developing a SWPPP is to protect wetlands and water resources at Devens from construction related sedimentation, and construction related pollution.

CONSTRUCTION ACTIVITIES

Construction activities which will likely be conducted at Devens have the potential to impact water resources through sedimentation or accidental release of hazardous materials. The magnitude and location of these activities need to be assessed in order to develop an effective, site-specific SWPPP. A site-specific SWPPP for facility construction and operation, which details the proposed construction sequencing and specific construction activities proposed by each individual site user, will be required as part of an application for a Development Permit from the Devens Enterprise Commission. Specific activities which may affect water quality include:

- clearing,
- grading,
- staging areas,
- off-site tracking of sediments,
- storage of materials and equipment.

The following subsections describe critical construction activities, and measures that should be undertaken during different construction stages to reduce the potential for transport of sediments or other contaminants to surface waters.

Construction Staging Plans and Vehicle Access Plans

As noted in the Devens Bylaws and Water Resources Protection Report, construction planning for new development should be designed, where possible, to use pre-existing disturbed sites and to minimize new site clearing and disturbance. Each construction plan should identify staging areas and vehicle access points during the planning and design of each individual project, in a manner which minimizes impact to the surrounding area. The staging areas should provide worker parking, construction headquarters, and temporary sanitary facilities, and be located and designed in a way that minimizes the potential for pollutant discharges to waterways or drainage systems.

Tracking of sediments from construction sites onto existing roadways may result in increased turbidity or sedimentation of surface waters. Measures should be used to control off-site sediment tracking. Some effective measures include sediment tracking pads (see Appendix Figure A-1), stabilized construction entrances, and regular sweeping of any existing on-site paved areas and adjacent off-site roadways.

Material Storage/Vehicle Maintenance and Refueling

The storage of construction materials and equipment, and any maintenance or refueling of equipment, are potential sources of contaminants to surface or ground waters. To prevent pollution, staging facilities should be designated for storage and vehicles. These areas should be as far away from sensitive areas as possible to minimize the potential for contamination to water resources.

Storage, maintenance and refueling areas should be surrounded with sediment control measures to contain and filter runoff leaving the area. Any vehicle refueling should be done on an impervious surface enclosed in a temporary berm to prevent drips or spillage from contaminating soils or ground water. Oil/water separators may also be installed as temporary construction measures to contain spills or remove contaminants from runoff. All areas where vehicle maintenance or refueling occurs should be equipped with spill control materials, including absorbent pads. The necessary equipment, notification procedures and other spill response requirements for maintenance areas will be included in the Devens Spill Prevention Control and Countermeasure (DSPCC) Plan.

Site Clearing Sequence

Exposed soil surfaces, created through site clearing and grading, pose the greatest potential for erosion and the transport of sediments. To protect sensitive water resources, no site clearing should be undertaken until sedimentation control barriers have been installed at the site perimeter and between areas of clearing and any wetlands or surface waters. A rational construction sequence should be developed that minimizes the area of clearing and grading, and keeps vegetation or stabilized surfaces from being removed or disturbed earlier than necessary. Maintaining existing vegetation will minimize the amount of disturbed area, thereby minimizing the potential for sedimentation. The preservation of vegetation between construction areas and wetlands will also act as a buffer and filter strip to trap sediments.

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Sediment and Erosion Control

All construction activities at Devens should be undertaken using appropriate erosion control to minimize potential impacts to environmental resource areas. Erosion of disturbed soils on-site, and the transport of suspended sediments to off-site surface waters or wetland resources constitutes one of the most common sources of construction-related contaminants. To reduce this potential impact, site-specific erosion and sedimentation control plans should be prepared for any development or construction activity at Devens, and should provide a plan for immediate stabilization of disturbed areas, installation temporary erosion controls, precise sequencing and coordination of construction, and implementation of inspection and maintenance programs.

Measures that can be utilized to reduce erosion and sedimentation include strategies and structural measures to:

- minimize the amount of disturbed soils,
- divert off-site runoff and reduce surface flows across exposed soils,
- install barriers or filters to trap sediments on-site,
- construct temporary sedimentation basins to collect surface runoff and allow settling of sediments,
- filter any dewatering effluent and discharge into upland areas.

Excavation, Grading and Borrow Materials

Excavation and grading will be required to construct new facilities at Devens. Some projects will require large amounts of material to be excavated and extensive amounts of fill to be placed to achieve final grades. Prior to grading, suitable topsoil should be stripped from the surface of the site, segregated, and stockpiled for use during final grading. Stockpiled soils should be surrounded by erosion control devices to prevent off-site sedimentation. If the soil is stockpiled for longer than one month, it should be seeded with annual rye for stabilization. Structural fill may be required including gravel, sand, or crushed stone which will be brought from off-site sources to prepare for the construction of foundations, parking areas, and ground water recharge systems. All fill material should be clean and free of hazardous materials which could potentially contaminate ground or surface waters. Borrow material from off-site sources will be inspected and tested to verify that clean materials are used during construction.

Stabilization

Soil stabilization is critical to the control of erosion and sediment transport in runoff. Temporary soil stabilization measures, including mulch and seeding with fast-growing annual grasses, should be utilized for any disturbed area between the completion of rough grading and final stabilization. These measures should be described and identified in any SWPPP prepared. Permanent stabilization (paving, landscaping) should be installed as soon as possible following final grading.

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BEST MANAGEMENT PRACTICES

Water quality protection during construction can be accomplished by use of a combination of Best Management Practices (BMPs), a variety of structural and non-structural measures that reduce the quantity of pollutants in runoff entering surface and ground water resources. This section provides descriptions of commonly used BMPs for construction, an evaluation of their effectiveness, and discussions of appropriate uses. Illustrations of most structural BMPs which can be used or adapted for site-specific SWPPPs, are provided in the Appendix. The Environmental Protection Agency's document, titled "Stormwater Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices", provides additional information regarding best management practices for construction.

Non-Structural Stabilization Practices

The following non-structural controls provide stabilization of disturbed areas without requiring extensive engineered treatment systems and artificial runoff control measures. Any SWPPP prepared for use at Devens should identify which of these BMPs will be utilized, and provide information on the specific implementation. Non-structural controls focus on the preservation of existing vegetation or rapid revegetation of disturbed soil as the most effective ways to control erosion during construction. Vegetation reduces erosion by providing cover, slowing runoff velocities, and stabilizing soil.

Preservation of Natural Vegetation

Preservation of natural vegetation provides the most effective erosion and sedimentation protection. Natural vegetation reduces the force of falling rain, holds soil particles in place, maintains absorptive capacity of the soil, slows the velocity of runoff, and acts as a filter to catch sediment. Preserving natural vegetation also provides areas for infiltration, reducing the quantity and velocity of stormwater runoff. Natural vegetation also generally requires less intensive maintenance and little or no use of fertilizers or pesticides.

Temporary Seeding

Temporary seeding provides a short term vegetative cover on disturbed areas that reduces erosion and sedimentation by stabilizing soils. Temporary seeding is performed on areas which have been disturbed and which will be redisturbed over a period of time. Typical areas for which temporary seeding can be effective include soil stockpile areas, sides of sediment basins, dams, and temporary roadbanks. Temporary seeding also reduces maintenance costs of other BMPs such as temporary detention basins, by preventing the basins from filling with sediments too quickly. Temporary seeding, typically composed of annual rye, should be provided on disturbed areas that will remain disturbed for more than 14 days before construction resumes, if construction stops during the growing season.

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Mulching

Mulching is a temporary soil stabilization or erosion control practice in which hay mulch, grass, straw or wood chips are placed on the soil surface to reduce the impact of rain and the velocity of stormwater runoff across disturbed areas. Mulching stabilizes the soil and retains moisture which aids plant growth. Mulching is used on steep slopes and in critical areas, such as waterways and provides immediate protection against erosion to exposed soils.

Dust Control

Wind can cause erosion particularly during dry soil conditions, especially where vegetation is sparse. Various methods of dust control can be used to prevent dust from being transported off-site including wetting, mulching, spray-on adhesives, and stone.

Sweeping

The removal of sediments from paved surfaces on the construction site, or from roadways over which construction vehicles travel, is an effective means of preventing sedimentation of surface water resources. A SWPPP should include a description of an appropriate street sweeping program to be used during construction.

Structural Stabilization Measures

Structural controls are engineered, constructed features which may include diversion dikes and swales, hay bales, silt fence, and sedimentation basins. These measures divert runoff, control stormwater flows, trap sediments, and filter sediments from surface waters. Any SWPPP prepared for use at Devens should identify the appropriate structural BMPs for the specific construction site, and identify where and when during the construction process these should be implemented.

Staked Hay Bales and Silt Fence

Hay bales or siltation fence, installed either individually or in combination, are temporary erosion control measures which achieve sedimentation control by reducing runoff velocity and trapping the sediment load transported in runoff. Hay bales and silt fence may also provide a physical barrier that defines the limits of work of the construction site. These measures should be installed prior to site clearing, and maintained throughout construction.

Hay bales/siltation fencing may be installed at the perimeter of a site to reduce stormwater flow velocities onto disturbed areas and to trap sediment leaving the site in stormwater. In addition, these may be installed at the top of steep slopes, or part way along long slopes, to reduce erosive velocities of storm flows. Sedimentation barriers must be installed between any disturbed area and a wetland or surface water, and at the inlet and outlet points of open drainage structures.

Figure A-2 (see Appendix) illustrates a properly installed sedimentation barrier consisting of a combination of both measures. To operate effectively, these barriers must be securely staked and installed in a trench below surface level.

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Throughout construction these devices should be inspected and maintained following all major storm events, until the disturbed soil surfaces are stabilized.

Checkdams

Checkdams may consist of either hay bales or crushed stone placed in areas where sediment is being transported within a drainage ditch or swale. Checkdams reduce the speed of concentrated flows and trap and remove sediments from surface runoff. Figure A-3 (see Appendix) illustrates the proper placement of a hay bale checkdam.

Sediment Basins

A sediment basin is a dry basin used for settling, which has a controlled stormwater release structure used to collect and store sediment. Sediment basins treat and enhance water quality primarily through sedimentation. Runoff waters are retained which allow sediments and associated pollutants to settle out of the water column. Sedimentation basins should be installed at any location where concentrated stormwater flows outlet (at the outlet of perimeter controls, drainage swales or dikes). Basins must be designed to drain areas less than 5 acres, and with a capacity to hold 3600 cubic feet per acre of drainage area. Basins should have a minimum depth of 2 feet, and outlet through a riser pipe wrapped in filter fabric, or similar device designed to provide surface water protection.

Diversion Dikes/Drainage Swales

Diversion dikes and swales are temporary devices used to direct upslope surface runoff away from disturbed areas. Diversion dikes are also used to divert sediment-laden runoff to sediment basins. Dikes are usually constructed of compacted earth, stone, or hay bales.

Drainage swales are shallow watercourses used to collect and convey surface runoff across the ground surface to a release or discharge point. Drainage swales can be naturally occurring or man-made features. A swale may be a natural depression or wide, shallow, or stone-lined waterway used to temporarily store, route or filter runoff. Swales of sufficient length can be very effective in enhancing the quality of stormwater runoff.

Storm Drain Inlet Protection

Storm drain inlet protection is a filtering measure in which gravel or stone, hay bales, silt fence, or sod is placed around a stormwater inlet to intercept sediment laden runoff prior to entering the stormwater collection system (see Appendix Figure A-4). This measure should be used where proposed construction occurs on previously existing paved areas with a subsurface drainage system. This method also prevents the silt-in of inlet structures. The type of material used will depend on site conditions and the size of the drainage area. At a minimum, filter fabric should be placed under the catch basin grate to trap sediments, and should be installed so that the grate can easily be removed without dislodging the fabric and trapped sediment.

Storm drain inlets may also be protected by placing a fabric filter sack into the catch basin. The weight of the catch basin grate holds the filter sack in place.

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The filter sacks, which are available in a variety of sieve sizes, must be inspected regularly and replaced when full to maintain their effectiveness.

Dewatering Measures

Dewatering may be required during construction to remove excess water from excavations. Dewatering may also be required to lower the ground water table. Prior to discharging accumulated water, filtering should be provided to minimize adverse impacts to water resources. Pumping should be done from a perforated pipe, wrapped in filter fabric, installed in a crushed stone sump pit to minimize the amount of sediments contained in the water. A hay bale and silt fence corral or filter bag may also be used to filter sediments during the dewatering operation. All dewatering effluent should be discharged into upland areas, and not directly into any surface water, wetland, or drainage system. The direct discharge of dewatering effluent into a surface water or wetland would require the issuance of an industrial discharge permit from the DEP and the EPA.

Erosion Control Fabrics

Erosion control fabrics are manufactured from synthetic and natural materials generally woven together to create a netting or matting. Mulch mattings (jute, wood fiber) are used to hold mulch materials to the ground surface. Erosion control fabrics may also contain the mulch materials and can be used alone to stabilize soils. Erosion control fabrics are used on planted slopes to protect seedlings until they become established. These should be used to provide temporary stabilization on any slope with a gradient of 2:1 or steeper.

INSPECTION, MAINTENANCE AND MONITORING

This section describes standard procedures for monitoring the effectiveness of stormwater management controls during construction at Devens. The Devens Enterprise Commission (DEC) should impose monitoring requirements for construction such as inspection reports, stormwater sampling, and compliance with performance standards. Also, where necessary, DEC should require site users to establish ambient water quality conditions through surface and ground water monitoring to serve as a baseline to measure future monitoring results. The DEC should determine on a site-by-site basis, based upon materials, site location in relation to water resources, and other relevant criteria at each site, which site users will be required to conduct baseline and ongoing water quality sampling.

Monitoring during construction focuses on inspection and maintenance of temporary erosion and sedimentation controls (e.g. hay bales, silt fence). Monitoring requirements may vary widely depending on the type of facility, site conditions, downstream receiving water bodies, and regulatory jurisdictions. At a minimum, periodic inspection of stormwater controls is necessary to maintain their continued effectiveness.

Because of the likely variation in future site-specific uses at Devens, this section provides both standard procedures to be used in most situations and additional guidance which will allow a monitoring program to be tailored to the needs of individual site users at Devens. Whatever the use, monitoring typically includes visual inspection of controls and sampling of stormwater flows discharged from a

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facility site. The following monitoring programs for construction apply to all Water Resource Protection (WRP) Districts at Devens.

Inspection and Maintenance

An inspection and maintenance program for stormwater controls should be required as part of the Development Permit issued by the Devens Enterprise Commission (DEC). Maintenance includes ensuring that those procedures used to maintain vegetation, to control erosion and sedimentation, as well as other protective measures identified in the site-specific Erosion and Sedimentation Control Plan, are maintained in good and effective operating condition.

An effective program will identify the person responsible for inspection and monitoring; require written inspection records documenting the date of inspection, condition of sedimentation controls and any corrective actions taken; identify an inspection schedule that includes regular routine inspections as well as inspections prior to and following a storm event; specify corrective actions; and require on-site stockpiling of a quantity of hay bales, silt fence, or crushed stone for emergency repairs.

Water Quality Monitoring

Water quality samples may be required for facilities that receive a Development Permit, where the site is adjacent to a sensitive water body. This will be determined on a site-specific basis depending on the size of the project and the potential impact of construction on receiving waters. Where the DEC determines that a water quality sampling program is required in order to protect surface waters, a monitoring program should be undertaken. Monitoring should remain in place throughout the construction period to assure that construction will not adversely affect water resources at Devens.

Prior to construction, baseline sampling should be done to establish potential impacts as a result of construction. During construction, turbidity samples should be required upstream and downstream of the construction site during dry conditions and for rainfall events in excess of 0.50 inches. Construction monitoring is intended to serve as a "trigger" for careful inspection of erosion and sedimentation controls to identify any defects in the BMPs established on the site. Exceedance of the threshold value is not intended to require the initiation of penalties or other actions by the DEC. Where turbidity immediately downstream of the site exceeds turbidity immediately upstream of the site by more than 50 percent, and where no difference in turbidity was recorded during pre-construction monitoring, immediate action should be taken to identify the source of sedimentation and corrective actions should be immediately undertaken.

Individual site developers should be responsible for preparing a sampling program which will be submitted to the DEC for approval. The sampling plan will include at a minimum: sampling objectives, sampling collection and analysis summary, and quality assurance/quality control procedures. Stormwater quality monitoring reports should be submitted to the DEC on a monthly basis during facility construction. These reports will document the rainfall amount, results of sampling, and any corrective action taken.

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STORMWATER POLLUTION PREVENTION DURING OPERATIONS OF NON-INDUSTRIAL ACTIVITIES

This section is intended to provide guidance for the design of site-specific stormwater management plans to protect surface and ground water resources at Devens following site construction. It describes a range of stormwater pollution prevention techniques which should be applied by site users at Devens. While these techniques are typical, site-specific conditions will dictate which stormwater pollution prevention measures are appropriate and should be incorporated into an ongoing, site-specific operations plan.

PURPOSE

The purpose of the section is to provide general guidance on the availability of BMPs that can be designed and implemented to minimize impacts from stormwater runoff during facility operations.

The stormwater contaminants, and BMPs for protection of water resources, described in this section pertain to stormwater runoff generated from roadways, commercial, and business users. This plan does not specifically address the quality of stormwater generated by facilities designated as "Industrial Activities" by the EPA's NPDES program. Where several new development or redevelopment activities are proposed within the same subwatershed of Devens, the DEC should encourage site developers to coordinate preparation of their SWPPPs and investigate means of providing stormwater management at the watershed level.

SOURCES OF STORMWATER CONTAMINANTS

Business, residential, recreational and infrastructure developments and facilities may contribute contaminants to stormwater runoff, which may affect the quality of surface or ground water. Roadways and parking lots (collectively, "paved areas") are important contributors to non-point source pollution. Metals, hydrocarbons, salts, and sediments are the contaminants most commonly transported in stormwater runoff from roadways. Traces of metals such as lead, iron, chromium, cadmium, copper, mercury, and zinc as well as various hydrocarbon compounds accumulate on paved surfaces as a result of wear of the roadway, vehicle engines, tires, brakes, and leakage of vehicle fluids. Salts and sediments used in parking lot or roadway maintenance activities also accumulate on road surfaces. During storm events, these accumulated materials are carried to receiving waters via stormwater runoff. The contaminants carried

in runoff from paved areas may have adverse affects on water quality and aquatic ecosystems if they occur in surface waters in sufficient concentrations.

Erosion of sediments from exposed soil surfaces and the siltation of downgradient water bodies may potentially result in short-term or cumulative water quality impacts. The transport of sediments to water bodies results in increased suspended solid concentrations within the water column of the receiving waters. Recreational, residential, or landscaped areas within commercial developments may also contribute nutrients (nitrogen and phosphorus) from lawn or garden fertilizers or animal wastes, as well as pesticide or herbicide residues.

BEST MANAGEMENT PRACTICES

This section describes a range of Best Management Practices (BMPs) that should be incorporated into the design and operations of new or reconstructed facilities at Devens to mitigate and reduce impacts associated with stormwater contaminants. It also outlines various treatment mechanisms which can be applied by each site user in developing a site-specific SWPPP, reports their effectiveness, and discusses their appropriate use. Water quality treatment objectives can be met through a variety of structural and non-structural BMPs. Site-specific proposals should be reviewed by the Devens Enterprise Commission to see that Devens water quality objectives will be accomplished.

Structural BMPs

Structural BMPs are engineered and constructed elements of site drainage design intended to remove sediments and other contaminants from stormwater runoff prior to discharge to a street drainage system, a wetland or surface water body, or a ground water recharge system.

Catch Basins

Catch basins with hood traps and sumps are drainage structures located at low points or along water flow paths throughout the drainage area to intercept and collect surface stormwater runoff. Catch basins convey stormwater via pipes into a closed drainage system, and should be used as the first measure in stormwater management from paved areas and parking lots.

When stormwater flows into the catch basin, sediment settles into a sump. The hood trap is designed to retain floatable debris and petroleum products within the catch basin, and thereby improve water quality. Figure A-5 (see Appendix) provides a schematic illustration of a typical catch basin with a sump and hood trap. When designed with sumps and hood traps, catch basins can effectively remove sediments and adsorbed pollutants from stormwater runoff. When properly maintained, catch basins remove 50-70 percent of sediment present in stormwater runoff.

Oil/Water Separators

Oil/water separators are underground structures used within a drainage system to collect and separate oil, gas, grease, and other floatable petroleum-based chemicals from stormwater runoff. Oil/water separators are used to treat

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stormwater runoff from parking areas to remove floatable materials and suspended solids not removed by the catch basin. When catch basins and oil/water separators are used in combination, the drainage system provides an even greater degree of pollutant removal efficiency. Figure A-6 (see Appendix) presents a schematic diagram and details on characteristics and requirements of the oil/water separators which could be installed by individual site users at Devens.

The oil/water separators should be located to intercept potential releases of petroleum products or floating material resulting from an accidental release or spill. The chambers of the oil/water separator provide for a freeboard volume to capture floating petroleum hydrocarbons, accommodating an accidental release of petroleum product. For maximum effectiveness, oil/water separators should be designed to be "off-line" to intercept low flows which constitute the "first flush" of stormwater runoff. Larger storm flows should bypass the structure to avoid flushing accumulated sediments. Separators should be installed where stormwater discharge may affect sensitive surface or ground water resources, or where facility use creates a potential for spills.

Filter Strips/Level Spreaders

Filter strips are linear features over which low volumes or low velocity stormwater flows pass. The rough surface and absorptive substrate of a filter strip slows stormwater velocity and removes and traps sediments. These are typically installed along the edge of a parking lot or roadway, particularly where the drainage area is small.

A vegetated filter strip is a vegetated area, contiguous to a developed area, designed to accept overland sheet flow. Filter strips can be composed of an undisturbed forested area or created from a disturbed area by proper seeding and planting. Level spreaders are structural devices used to capture and evenly distribute runoff while reducing the potential for channelization. Filter strips should only be located on slopes of 5 percent or less to avoid channelization and enhance filtering and infiltration of stormwater runoff. A level spreader should be used along the entire top edge of a vegetated filter strip. This can be a stone filled trench that evenly distributes the stormwater runoff. The length and width of the filter strip will be determined based on site-specific conditions to achieve the desired removal efficiency.

Grassed Swales

A grassed swale (see Appendix Figure A-7) is a grassed waterway used to convey stormwater runoff. Swales have a limited capacity for stormwater management and are used primarily in combination with other BMPs to meet stormwater management requirements. Swales can improve water quality through infiltration and sediment deposition. Swales can be made more effective if check dams are installed along the flow path to reduce runoff velocity thereby promoting infiltration and sediment deposition. The bottom of the swale must have slopes close to zero to prevent excessive velocities and erosion within the swale. There must be a minimum separation distance of two feet between the bottom of the swale and the seasonal high water table. Swales should be designed to accommodate peak runoff volumes from the 100-year storm.

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Outlet Protection

Outlet protection is required at the discharge points from any stormwater basin, grassed swale, or pipe conveyance system to minimize soil erosion due to high velocity stormwater flows. An effective means of outlet protection should reduce stormwater flow to a non-erosive velocity (less than 2 feet per second) and eliminate the potential for scouring below the outfall. Acceptable measures include rip-rap aprons or stilling basins, generally in combination with flared-end sections. Outlets from stormwater drainage/management systems should be set back as far as practicable from wetlands or surface waters, to allow infiltration and sediment trapping to occur in upland areas.

Stormwater Management Basins

Constructed stormwater management basins are effective BMPs for control of the rate and quantity of stormwater runoff. This section describes three types of constructed basins, and identifies general construction and design standards.

Wet Basins - Wet basins are constructed stormwater basins which maintain constant ponded water. These are extremely effective water quality BMPs, if proper design and maintenance procedures are followed (see Appendix Figure A-8). A high removal rate of sediment, contributors to biological oxygen demand (BOD), organic nutrients, and trace metals can be accomplished using a wet basin. This type of BMP also reduces the peak discharge rates from stormwater runoff. Gravity settling is the primary water quality treatment mechanism for particles and sediments in the basin.

The following general considerations should be followed for basin siting and design for site users at Devens. Wet basins should be located in a naturally low area in the landscape, however, the basin floor should be at least four feet above the seasonal high water level to reduce the potential for contaminants to enter the ground water. Basin side slopes leading down to the permanent pool should be 3:1 or flatter. Low slopes promote vegetative diversity, erosion control, pollutant removal, and safety. A low shelf should be constructed within and around the basin for vegetation establishment, maintenance and safety.

The minimum required permanent pool volume is determined by multiplying the total impervious surface areas (not including roof tops) of the contributing watershed by one inch. A minimum length to width ratio of 3:1 is required for any basin. The average depth should be approximately three to six feet; the deep section of the permanent pool must have a minimum depth of three feet and a maximum depth of 10 feet. All basins must have an emergency outlet to accommodate storm flow volumes in excess of the 100 year storm. All inlet and outlet concentrated flow areas should be protected from erosion and scouring. Inlets and outlets should be separated by the maximum practicable distance, to increase flow path length and promote settling or removal of sediments and contaminants. Wherever possible, basins should be designed to provide an indirect or interrupted flow path between the inlet or outlet.

Extended Detention Basins - Extended detention basins are very useful for controlling excessive peak discharge rates, removing pollutants, and controlling increases in downstream bank erosion. Extended detention basins provide two stages of detention. The upper stage is used to store runoff volumes from larger infrequent storms, while the lower stage detains runoff water quality volume

from the site and is managed as a shallow wetland area. Extended detention basins are effective in controlling post-development peak discharge rates at or below pre-development levels for specified design storms.

The basin should be designed as a two stage facility with the upper stage sized to contain the 2, 10, 25, and 100-year storms. The minimize size for the lower stage must be equal to the runoff volume of one inch multiplied by the impervious area. The minimum length to width ratio of the basin should be 3:1. The design bottom of the basin will be at least three feet above the seasonal high water level. All inlet and outlet concentrated flow areas should be protected from erosion. Inlets and outlets should be separated by the maximum practicable distance, to increase flow path length and promote settling or removal of sediments and contaminants. Wherever possible, basins should be designed to provide an indirect or interrupted flow path between the inlet or outlet.

Infiltration Basins - Infiltration basins are effective in removing both soluble and fine particulate pollutants in stormwater runoff. These basins are designed to retain all runoff from high-frequency storm events and provide ground water recharge. When properly designed and sized, infiltration basins can completely manage peak discharges from design storms, provide ground water recharge and low flow augmentation, reduce storm runoff volumes, and protect downstream channels from erosion.

Coarse sediments should be removed before entering the infiltration basin. This requirement can be satisfied by installing catch basins, sediment control basins, or oil/water separators of sufficient storage capacity. The maximum allowable ponding time for infiltration systems is 72 hours to insure the necessary storage volume for subsequent storm events. The basin should be designed to hold the volume generated by a 2-year storm. A sediment forebay should be installed to prevent sediment from clogging the basin over time. A minimum of three feet of clearance is needed between the floor of the basin and the seasonal high water table. The floor of the basin should be stabilized by a dense turf of water tolerant vegetation, and inlet and outlet concentrated flow areas should be stabilized to prevent erosion.

Non-Structural BMPs

Non-structural BMPs include long-term maintenance programs and practices intended to provide source control of potential stormwater contaminants.

Deicing

Salts (sodium or calcium chlorides) applied to remove ice and snow from roads, parking lots and sidewalks may enter surface and ground waters from stormwater runoff. Due to their extreme solubility, almost all salts applied for snow and ice removal end up in surface and ground water. Conventional BMPs such as wet basins and grassed swales which rely on settling to remove contaminants are not effective in removing salts in stormwater runoff.

In order to minimize the effects of deicing compounds on surface and ground water quality, alternative methods of removing ice and snow will be encouraged at Devens. The following minimum criteria for salt storage and application, should be required in all water resource protection areas at Devens:

- Piles of sodium chloride, and other chemicals used for snow removal on roads should be stored under cover on flat, impervious surfaces protected from runoff. Drainage structures should be in place to direct runoff away from deicing materials storage areas.

- Outfit deicing material application equipment with calibrated delivery systems for optimal control of application rates.

- Direct application of 100 percent road salt to parking areas is prohibited by the Devens Bylaws. A 4:1 ratio of sand to salt (by weight) has been demonstrated to be effective.

- Deicing materials should be applied at the minimum amounts necessary for public safety.

- The use of deicing materials for roadways is not to exceed the low-salt application rate of 150 pounds/lane mile per pass. For parking lots, this is approximately 100 lbs per acre per pass.

- The use of alternative deicing materials for parking areas will be encouraged. Parking lot maintenance practices should emphasize snow removal, with minimum (spot application) use of deicing chemicals.

Pavement Sweeping

A pavement sweeping program is an effective means of controlling sediments before reaching the stormwater treatment system, and has been demonstrated to provide an 80 percent removal effectiveness. Pavement sweeping removes excess sediments from paved areas, which reduces the amount of sediments entering the treatment system. Facility operators are encouraged to develop a pavement sweeping program as part of the site-specific SWPPP to reduce contaminant loading by providing control of particulates and adsorbed contaminants at the source, before these particulates become components of runoff.

INSPECTION, MAINTENANCE AND MONITORING

This section describes standard procedures for inspection, maintenance, and monitoring the effectiveness of stormwater management controls during operations at Devens. For site developers and users at Devens, the Devens Enterprise Commission (DEC) should impose monitoring requirements for operations such as inspection reports, stormwater sampling, and compliance with performance standards. Also, where necessary, DEC will require site users to establish ambient water quality conditions through surface and ground water monitoring to serve as a baseline to measure future monitoring results. The DEC should determine on a site-by-site basis which site users will be required to conduct baseline and ongoing water quality sampling based upon materials, site location in relation to water resources and other relevant criteria at each site.

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Maintenance and Inspection Requirements

Effective long-term stormwater treatment facilities require regular inspection and maintenance. Failures of stormwater management structures can be attributed to a poor inspection and maintenance program and require costly repairs. As part of the Development Permit, site owners or operators should be required to submit an inspection and maintenance program for proposed stormwater treatment facilities included as part of their site development. The following are minimum requirements for an effective maintenance and inspection program.

- develop a maintenance schedule for each type of BMP in the proposed development listing the frequency and type of maintenance operations and responsible parties,
- mow side-slopes and embankments of detention/infiltration basins at least once per year to prevent the establishment of woody vegetation,
- remove trash and litter from stormwater facilities on a regular basis,
- remove sediments from basins at least every 10 years or more frequently if accumulation reduces the design volume by more than 10 percent,
- correct all deficiencies to treatment facilities such as unwanted ponding or scouring,
- stabilize erosion problem areas by reseeding or other corrective measures, and
- prepare and submit semi-annual reports to the Devens Enterprise Commission documenting inspection and maintenance, indicate problem areas, and any corrective measures implemented.

Regular maintenance of all components of proposed stormwater management systems at Devens is required to provide ongoing protection to surface and ground water quality. The key to successful long-term operation of stormwater facilities is proper, regularly scheduled maintenance. The DEC should require routine maintenance operations for facility operators and should require site users to prepare a maintenance schedule for all stormwater facilities and prepare an annual report documenting compliance with the maintenance schedule. The following list describes at a minimum the type and schedule of maintenance required during facility operation for a typical stormwater management system:

- Catch basin grates should be checked monthly and following heavy rainfalls to see that the inlet openings are not clogged by debris. Any debris should be removed from the grates and disposed of properly. Catch basin sumps should be inspected and cleaned semi-annually of all accumulated sediments. Material removed from catch basins should be disposed of by a licensed contractor in accordance with all applicable regulations.
- Oil/water separators should be inspected semi-annually. Depending upon expected inflows into the separator, accumulated petroleum products or other floatables should be removed from the structure by a vacuum pump

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truck on an annual or semi-annual basis. Sediment deposited on the bottom of the separator should be removed annually.

- Outfall protection measures should be inspected semi-annually and following major storm events to check for signs of erosion. Any necessary repairs should be performed promptly. All outlet protection structures should be inspected semi-annually and cleaned to remove accumulated sediment.

- Drainage swales should be checked for debris accumulation on a monthly basis. Trash, leaves, branches, etc., should be removed from channel areas. If significant accumulation of silt, sand, and sediment occurs, it should be removed annually. Any channel erosion within the swale should be stabilized as soon as practical.

- Detention basins should be checked monthly and immediately after heavy rainfall events to ensure outlets and inlets are not blocked by litter or other debris. Accumulated debris should be removed as soon as possible. Basin slopes and embankments should be checked for signs of erosion. Eroded slopes should be stabilized to eliminate future deterioration of the structure.

- Wet basins should be checked periodically during wet seasons and after heavy rains to ensure the basin is functioning as designed and containment dikes are not being overtopped. The basin embankment should be stabilized so as not to erode or result in sedimentation within the basin. Accumulated debris and sediment within the basin should be checked at least annually and removed as necessary. Sediment accumulation should be monitored and removed when it reduces the volume of the basin by more than 10 percent.

- Vegetative growth within the basin should be monitored and maintained as needed. Tree and brush growth should be removed annually to protect the structural integrity of the embankment.

- Infiltration trenches should be checked semi-annually and following major storms to check for surface ponding that might indicate clogging. Infiltration trenches may have to be replaced as their permeability decreases over time. Pre-treatment inlets of underground trenches should be checked periodically and cleaned out when sediment depletes more than 10 percent of the available capacity.

- Infiltration basins should be inspected annually for settling, cracking, eroding, leaking, and accumulating sediment. Repairs should be made as necessary. Particular attention should be given to the standing water in the basin. Standing water in the basin beyond the designed specification would indicate that the infiltration capacity of the basin has diminished. Factors that influence clogging such as accumulated sediment or excessive compaction should be determined and any repairs made.

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Stormwater Quality Monitoring

A stormwater quality monitoring program should be developed for facility operations to determine whether stormwater treatment systems are effectively removing pollutants from site runoff after development at Devens. The DEC should determine if stormwater quality monitoring is required on a site-specific basis, based on the potential to impact water resources. Any water quality monitoring program should include a statement of objectives, sampling procedures, sampling locations, parameters to analyze, methods of analysis, and details of all quality assurance/quality control (QA/QC) procedures utilized.

Sampling should be planned to determine if stormwater runoff from the site adversely affects water quality in the receiving surface water, and to monitor the effectiveness of the stormwater management and treatment system. To assess impacts to surface waters, samples taken immediately upstream and downstream of the site or its discharge point should be compared. To assess effectiveness of the stormwater management system, samples should be collected at the inlet and outlet of the system.

At each sampling event, surface water samples should be analyzed for a variety of constituents. The parameters should include but not be limited to total suspended solids, total petroleum hydrocarbons, metals (lead, zinc, copper), oil and grease, pH, and turbidity. Stormwater samples should be collected by filling sample bottles directly from the water source. Samples should be bottled in appropriate containers using proper preservation methods.

Chain-of-Custody protocols should be used to ensure the integrity of the sample from the time of collection to date reporting. A Chain-of-Custody Form developed specifically for this sampling effort should be completed at the time of sampling. A Massachusetts-certified laboratory should be contracted to analyze the surface water samples. The selected laboratory should have a QA/QC program to ensure the integrity of the analysis as well as the results of the analysis.

Reports of sampling results should be prepared quarterly and submitted to the DEC. All sampling reports should include the following information:

- Executive Summary,
- Summary of Monitoring Plan,
- Figure showing sampling locations,
- Table of sampling results,
- Narrative discussion of results,
- Narrative discussion of QA/QC, and
- Appendix with copies of laboratory certificates of analysis.

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EFFECTIVENESS OF BMPS

Several studies indicate the effectiveness of stormwater operational BMPs in removing contaminants from stormwater runoff from paved areas. In each of these studies, the estimated concentration of contaminants in untreated stormwater runoff at the site was determined using mean concentrations from the EPA's Nationwide Urban Runoff Program report (1983). The concentration of contaminants in treated stormwater runoff at each site was either measured directly, or estimated using the P8 Urban Catchment Model.

The results of four studies are presented in Tables 1 through 4 below. These studies demonstrate that stormwater management systems consisting of catch basins, oil/water separators, and detention basins are effective at removing typical stormwater contaminants. Removal of suspended solids by such systems generally exceeds 90 percent, while removal of organic compounds and metals exceeds 50 percent. This value is lower for compounds with a high level of solubility, such as copper. In most cases, more than 80 percent of hydrocarbons present in parking lot runoff are removed by these systems. The data (see Table 4) also indicate that removal efficiency is high even for systems consisting only of catch basins, when an aggressive pavement sweeping program (a non-structural BMP) is also implemented.

Table 1

COMPARISON OF ACTUAL (MEASURED) POLLUTANT LOADINGS VS. ESTIMATED UNTREATED LOADINGS AT LOGAN AIRPORT*

Constituent	Actual Loading**	Estimated Loading	Removal Efficiency
TSS	156,000	1,750,000	91%
Copper	575	447	0
Lead	10	3300	99%
Zinc	1090	2840	62%

* Treatment system consists of catch basins and oil/water separators. Estimated loadings based on NURP mean values (EPA National Urban Runoff Program, 1983).

** lbs/year

Source Boston-Logan International Airport, Final Generic Environmental Impact Report, July 15 1993.

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Table 2

COMPARISON OF ESTIMATED TREATED AND UNTREATED STORMWATER RUNOFF AT A PROPOSED MALL*

Constituent	Untreated Runoff**	Treated Runoff	Removal Efficiency
TSS	100	9.5	90%
Phosphate	0.33	0.125	62%
Total Nitrogen	1.5	0.68	55%
Copper	0.035	0.02	54%
Lead	0.04	0.01	82%
Zinc	0.16	0.07	55%
Hydrocarbons	2.5	0.44	83%

* Treatment system consists of catch basins, oil/water separators, and wet basins. Estimated concentrations of untreated runoff based on NURP mean values (EPA National Urban Runoff Program, 1983). Estimated concentrations of treated runoff determined using P-8 Urban Catchment Model.

** mg/l

Source Shrewsbury Mall, Draft Environmental Impact Report, August 1993.

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Table 3

COMPARISON OF ESTIMATED TREATED AND UNTREATED STORMWATER RUNOFF AT A PROPOSED POSTAL SERVICE FACILITY*

Constituent	Untreated Runoff**	Treated Runoff	Removal Efficiency
TSS	307	19.4	93.3%
Phosphate	0.72	0.26	62.9%
Total Nitrogen	3.37	1.53	54.1%
Copper	0.09	0.043	54.1%
Lead	0.05	0.008	84.1%
Zinc	0.51	0.23	54.1%
Hydrocarbons	5.11	0.79	84.1%

* Treatment system consists of catch basins, extended detention basins, and filter berms. Estimated concentrations of untreated runoff based on NURP mean values (EPA National Urban Runoff Program, 1983). Estimated concentrations of treated runoff determined using P-8 Urban Catchment Model.

** mg/l

Source Stormwater Management Plan Summary, Northwest Mail Processing Center, Waltham MA, April 1994.

Table 4

COMPARISON OF ESTIMATED TREATED AND UNTREATED STORMWATER RUNOFF AT THE SOUTH SHORE PLAZA*

Constituent	Untreated Runoff**	Treated Runoff	Removal Efficiency
TSS	180	33	82%
Phosphate	0.15	0.04	73%
Copper	0.043	0.05	0
Lead	0.182	0.04	78%
Zinc	0.202	0.08	60%
PAH	-	ND***	-

* Treatment system consists of catch basins, oil/water separators, and wet basins. Estimated concentrations of untreated runoff based on NURP mean values (EPA National Urban Runoff Program, 1983). Estimated concentrations of treated runoff determined using P-8 Urban Catchment Model.

** mg/l

*** Not detectable

Source South Shore Plaza, Braintree MA, Final Environmental Impact Report, April 15, 1992.

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STORMWATER POLLUTION PREVENTION PLAN

The Devens Enterprise Commission (DEC) is committed to protecting the surface and ground water resources at Devens through enforcing Devens Enterprise Zone, state and federal environmental regulations. The purpose of developing performance standards for Devens is to control both the quantity and quality of stormwater runoff at Devens. Historic development at Devens has resulted in uncontrolled releases of stormwater runoff from impervious areas which over time have contributed to the degradation of the water quality of the Nashua River. Adherence to the following criteria, by all site users at Devens, should result in the design and construction of effective stormwater treatment systems which will protect and preserve the Devens aquifer, wetlands and surface water bodies, and other environmental resources at Devens.

OBJECTIVES

Stormwater Pollution Prevention Plans (SWPPP) are intended to document that appropriate BMPs have been selected to provide protection of surface and ground water resources during and after construction at any site at Devens. During construction, the primary objective of the SWPPP is to avoid or minimize the transport of sediments off the construction site through the design and implementation of an effective set of BMPs and a site-specific inspection and monitoring program. Following construction, the primary objectives of the SWPPP are to minimize increases in the rate or volume of stormwater runoff, remove pollutants from runoff (primarily by trapping or retaining sediments), reducing pollutant sources, and encouraging ground water recharge of treated runoff.

A SWPPP is required by the EPA under the National Pollutant Discharge Elimination System (NPDES) permit program for all construction sites greater than 5 acres in extent. The guidelines for SWPPP preparation provided below are intended to meet the requirements of the EPA permit program as well as allow site-specific solutions that will protect surface and ground water resources at Devens. Although not required by the EPA, it is recommended that any site construction at Devens be required to complete a SWPPP to protect water quality during construction. For construction sites larger than 5 acres, a Notice of Intent to perform construction under the EPA General Permit must be submitted to the EPA (Stormwater Notices of Intent, P.O. Box 1215, Newington VA 22122) at least 48 hours prior to the start of construction.

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GUIDELINES FOR STORMWATER POLLUTION PREVENTION PLANS

Stormwater Pollution Prevention Plans (SWPPP) should be prepared for any construction activity at Devens, including the redevelopment of existing sites, road construction, and construction on previously-disturbed sites. The SWPPP should clearly indicate the specific BMPs that should be implemented during and after construction to control sedimentation, prevent alteration of surface waters, and provide long-term protection for surface and ground water resources. The following should be required elements of any SWPPP prepared for Devens.

Analysis of Existing Conditions

An analysis of existing site conditions should be prepared to determine what site conditions could contribute to erosion or sedimentation problems during the construction process. This should include an analysis of any existing stormwater drainage system, a site cover (pervious vs. impervious areas) analysis, drainage areas and runoff rates, locations of steep slopes or erodible soils, depth to ground water, and should identify wetlands or surface waters within the project area.

Construction Analysis

An analysis of construction activities should be prepared to determine what construction activities could contribute to erosion or sedimentation during the construction process. This should include an analysis of the length and gradients of any slopes within the construction area, areas to be disturbed, changes in surface drainage flow patterns, potential discharges to existing drainage systems or surface waters, areas where dewatering may be likely, and a sequence of construction activities by area.

Construction BMPs

Site-specific BMPs should be identified for the project site, based on the construction analysis described above. At a minimum, the SWPPP should include a list of BMPs, specifications and standard details for each BMP, and a plan that identifies where each BMP should be used during construction. It may be necessary to prepare several construction sequencing plans showing different locations for BMPs during site development. A SWPPP should also identify the person(s) with primary responsibility for implementation of the Plan.

BMPs should be included in any SWPPP to address the following issues:

- Erosion and sedimentation control,
- Construction sequence,
- Staging areas,
- Equipment storage, maintenance and refueling,
- Sedimentation basins,
- Dewatering,
- Dust control,
- Waste disposal,
- Spill response,
- Off-site tracking of sediments,
- Temporary stabilization,

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- Inspection and monitoring.

Analysis of Proposed Conditions

An analysis of proposed conditions should be performed to identify sources of sediment or other stormwater contaminants, drainage areas and patterns, stormwater runoff rates, areas where recharge is feasible, and rates of recharge. The purpose of this analysis is to identify sources of pollutants and potential means of reducing discharge of stormwater and associated contaminants.

Operations BMPs

The SWPPP should identify site-specific BMPs for the project site, based on the analysis described above. At a minimum, the SWPPP should include a list of BMPs, specifications and standard details for each BMP, and a plan that identifies where each BMP should be installed. An on-going inspection and maintenance program is essential to continued protection of water resources. A SWPPP should also identify the person(s) with primary responsibility for implementation of the Plan.

BMPs should be included in any SWPPP to address the following issues:

- Structural BMPs for control of stormwater runoff rates,
- Structural BMPs for reduction of sediment loading,
- Structural BMPs for reduction of contaminant loading (particularly oils and other hydrocarbons),
- Non-structural BMPs for source reduction of potential contaminants,
- Spill response,
- Inspection and maintenance, and
- System monitoring.

Industrial Activities

The EPA requires preparation of a Stormwater Pollution Prevention Plan for any industrial activity where equipment or materials may come into contact with precipitation or where stormwater is discharged to a surface water body or municipal street drainage system. The majority of designated industrial activities do not require Individual NPDES discharge permits, but are subject to the General Permit which requires preparation of and adherence to a SWPPP. The EPA publication "Stormwater Management For Industrial Activities. Developing Pollution Prevention Plans and Best Management Practices" (U.S. EPA, 1992, EPA/832/R-92/006) provides detailed guidance on the preparation of site-specific SWPPPs.

"Industrial Activities" include facilities subject to stormwater effluent limitation guidelines or toxic pollutant effluent standards; heavy manufacturing facilities; hazardous waste treatment, storage or disposal facilities; recycling facilities; transportation facilities; or other industries where materials or equipment are handled or stored in areas where they may be exposed to precipitation. Any facility meeting these definitions must prepare a SWPPP that includes the

following elements:

- Designation of a responsible individual or team,
- Identification and evaluation of pollutant sources and risks,
- Site map,
- Identification and implementation of appropriate BMPs, including good housekeeping practices and stormwater management,
- Spill response plan,
- Stormwater sampling plan,
- Monitoring plan,
- Record keeping procedures and responsibilities,
- Process and schedule for evaluation and amendment of SWPPP.

PERFORMANCE STANDARDS

The design of post-construction stormwater management systems requires guidance to conform to the requirements of the Devens Bylaws for protection of surface and ground water resources. This section provides performance standards that have been prepared for construction on existing developed sites, roadway construction, and new construction on undeveloped sites that are specific to each of the Devens Water Resources Protection Districts.

Water Resources Protection Districts

The overall goal of the following performance standards and design criteria is to minimize adverse impacts on the surface and ground water resources at Devens while allowing development to proceed in an environmentally responsible manner. To achieve this goal the Devens Enterprise Zone has been divided into four Water Resource Planning Areas over which differing levels of water resource protection will be applied. The zones are defined as:

- Zone I: area within 400 feet of a well,
- Zone II: areas which contribute ground water to existing wells,
- Aquifer Zone: areas over the aquifer which are not included in Zone I or Zone II, and
- Watershed Areas: all remaining areas of the Devens Enterprise Zone outside the Aquifer Zone, Zone I, and Zone II.

Through the Devens Bylaw, varying levels of protection have been provided for each zone based on its level of sensitivity with the highest levels of control established for Zone I and Zone II. Lesser levels of control, with specific standards, have been established for the Aquifer Zone and Watershed Areas. Implementing the following objectives for stormwater management will enhance the water quality and quantity of runoff recharged to the aquifer through the use of BMPs.

In order to protect and enhance existing water quality at Devens, performance standards to control both water quantity and quality have been developed for each Water Resource Protection (WRP) District. The minimum standards for water quality and flood control may be achieved through a combination of site

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design, and structural and non-structural measures. The intent of stormwater management is to first reduce the volume of runoff generated, by minimizing the extent of impervious surfaces and enhancing overland flow and infiltration, and then to treat or control the off-site transport of runoff.

No performance standards have been prepared for Zone I because only work related to the maintenance or operation of a well will be allowed within Zone I. No development will occur within this area, which is defined as the area within 400 feet of a well.[1]

The following objectives should be met by all individual site users within all Water Resource Protection (WRP) Districts at Devens:

- Meet or reduce the peak rate and volume of runoff leaving the site to pre-existing conditions in order to minimize the risk of downstream flooding,
- Maintain adequate surface water flows to existing wetlands or surface water bodies,
- Maintain or improve water quality in stormwater leaving the site, and
- Maximize recharge of stormwater runoff to the aquifer.

The stormwater management objectives listed above are intended as guidelines for users, with the primary objective being to maintain or improve existing stormwater quality. Therefore, any reasonable means of meeting these objectives should be considered acceptable by the DEC, provided that supporting documentation is presented to the DEC for review. Some standards require specific methods of construction or evaluation to be used to meet the requirements. Methods which have been evaluated or approved for use have been identified. The intent of these standards is to encourage innovation to meet the water quantity and quality goals.

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Methods

The following methods are recommended for use in the analysis of stormwater runoff rates, volumes and quality.

- Runoff volumes or rates should be calculated for the 2-, 10-, 25-, and 100 year frequency, 24-hour duration, Type III distribution storm events.
- Measurement of peak discharge rates must be calculated using the property boundary as the design point.
- Technical Release 55 (TR-55) developed by the Soil Conservation Service (SCS), and revised in 1986, should be used for calculating runoff volume.
- Stormwater control measures should be designed to control the peak discharge rate of the 100-year, 24-hour storm event.

1/ The only exception to this is that two existing roads, Patton Road and MacPherson Road, are within Zone I. These roads will continue to be used.

- Water quality data are based on the point of discharge which is defined as "a conveyance (including pipes, conduits, ditches and channels) primarily used for collecting and conveying stormwater runoff".

- Water quality evaluations must be based on a 1-year storm event.

DEVELOPMENT IN UNDEVELOPED AREAS

Construction of new facilities within areas of Devens that are currently undeveloped, provides the greatest opportunity for the protection of water resources. Such sites generally are not constrained by existing drainage infrastructure, and have adequate space to construct stormwater management and treatment systems. These sites should be held to the highest standards in review of SWPPPs or permit applications.

Best Management Practices

For new construction on undeveloped sites, minimum levels of stormwater protection through use of BMPs may be specified. Such construction should utilize catch basins with hood traps and sumps, oil/water separators above any point of discharge from the site, and a source reduction program that includes sweeping and salt reduction. Additional BMPs should be identified for each site if necessary to meet the appropriate performance standards.

Performance Standards

Performance standards for management of stormwater runoff quality and quantity should be specified for any new construction on undisturbed sites. These should include, at a minimum, the following:

- The stormwater management system should result in an 80 percent reduction in total suspended sediment loading to surface waters or wetlands, based on a comparison of water entering and leaving the stormwater management system. This 80 percent standard only applies to particles larger than 50 microns (0.05 millimeters), and does not include fine silt/clay particles that are not removed by settling or filtration.

- The stormwater management system should result in an 80 percent reduction in petroleum hydrocarbon loading to surface waters or wetlands, based on a comparison of water entering and leaving the stormwater management system.

- In Aquifer and Zone II areas, projects should not result in any decrease in ground water recharge.

- The project should not result in any increase in runoff rates from the site.

- No new direct discharge of runoff to a wetland or surface water should be created. Any runoff should be discharged into upland areas, generally set back from the limits of wetlands or water bodies, and should flow across vegetated areas wherever practicable.

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- On-site stormwater recharge for the 2-year storm event is required for all sites within Aquifer Protection districts.

- Post development total runoff volume from a site should in no case, increase over the pre-development total runoff volume for a 2-year storm by more than 10 percent. All efforts should be taken to ensure that the post development runoff volume is less than or equal to the pre-development runoff volume.

- Wet basins are the preferred method of water quality treatment.

- If the project is located in Zone II, runoff from paved areas should be treated to remove 80 percent of sediments and hydrocarbons prior to discharge to an infiltration or ground water recharge structure.

- If the project is located in Zone II, there should be no increase in runoff volume to a surface water, wetland, or off-site drainage system.

DEVELOPMENT OF PREVIOUSLY DEVELOPED AREAS

Construction of new facilities within areas of Devens that are currently developed is generally constrained by existing drainage infrastructure and site size limitations. These sites may not have adequate space to construct stormwater management and treatment systems. The objective for "retrofitting" such existing sites should be to provide improvement in water quality leaving the site, to the greatest extent practicable given specific constraints and circumstances. The transport of sediments and petroleum hydrocarbons to surface or ground water should be reduced, and runoff rates should be maintained or reduced. Where extensive redevelopment of large parcels occurs, the complete redesign and reconstruction of the local drainage system may be appropriate.

Best Management Practices

For reconstruction of developed sites, minimum levels of stormwater protection through use of BMPs should be specified. During construction, the existing drainage system should be protected against the entry of sediments or contaminants, and measures should be implemented to prevent transport of sediments off-site. Existing catch basins, and any new catch basins, should be replaced with catch basins with hood traps and sumps. Oil/water separators should be installed above any point of discharge from the site, and a source reduction program that includes sweeping and salt reduction should be implemented. Additional BMPs should be identified for each site where feasible, to meet the appropriate performance standards.

Performance Standards

Performance standards for management of stormwater runoff quality and quantity should be specified for any development of previously developed areas.

These should include, at a minimum, the following:

- The stormwater management system should result in an reduction in total suspended sediment loading to surface waters or wetlands, based on a comparison of water entering and leaving the stormwater management system.

- The stormwater management system should result in an reduction in petroleum hydrocarbon loading to surface waters or wetlands, based on a comparison of water entering and leaving the stormwater management system.

- The project should not result in any decrease in ground water recharge for any project within an Aquifer District or a Zone II.

- The project should not result in any increase in runoff rates from the site.

- No new direct discharge of runoff to a wetland or surface water should be created. Any runoff should be discharged into upland areas, generally set back from the limits of wetlands or water bodies.

- If a discharge is being reconstructed, it should be set it back if possible.

STORMWATER POLLUTION PREVENTION FOR ROADWAYS

The construction of new roadways, or reconstruction of existing roadways, has the potential to affect surface or ground water quality. Performance standards are provided below that are specific to roadway construction within each of the WRPs at Devens.

Best Management Practices

For any roadway construction, minimum levels of stormwater protection through use of BMPs may be specified. Erosion and sedimentation control during construction should be developed to prevent off-site transport of sediments. During roadway reconstruction, any existing drainage system should be closed or protected against the entry of sediments. Additional BMPs should be identified for each site to ensure that the appropriate performance standards are met.

Performance Standards

It is difficult to specify performance standards for roadway construction, as it is generally not feasible to construct stormwater management basins or other constructed BMPs within roadway corridors, and may not be possible to control some potential sources of roadway contaminants. For roadways, it is more appropriate to specify BMPs that protect surface or ground water to the levels required within each of the Devens WRPs. These should include, at a minimum, the following for all roadway construction projects:

- No new direct discharge of runoff to a wetland or surface water should be created. Any runoff should be discharged into upland areas, generally set back from the limits of wetlands or water bodies.

DRAFT

- Outlet protection should be used at any point where concentrated runoff leaves a component of the drainage system.

- A source reduction program, using regular sweeping and reduction in salt usage (a maximum of 150 lbs/lane-mile per pass).

- Install detention or infiltration basins where practicable, particularly where these would provide protection to wetlands or surface water bodies.

Watershed District

Protection of water resources within the Watershed District may be enhanced if roadways are constructed/reconstructed using the following BMPs:

- Grass swales to convey stormwater runoff, filter sediments, and enhance recharge,

- Installation of catch basins with hood traps and sumps,

- Outlet protection at the ends of any swales or discharge points.

Aquifer District

Aquifer Districts require a higher level of protection for surface and ground water resources, particularly where roadways are designated as primary routes for transport of hazardous materials. The following BMPs are intended to be used as performance standards within this District.

- Install a closed drainage system with catch basins with sumps and hood traps.

- Catch basins on any designated primary route should be equipped to intercept floating product.

- Utilize outlet protection at the discharge from any drainage system point.

- Install extended detention basins wherever feasible to reduce runoff rates, improve water quality, and promote recharge.

Zone II

Zone II areas require the highest level of protection for surface and ground water resources, particularly where roadways are designated as primary routes for transport of hazardous materials. The following BMPs are intended to be used as performance standards within this District.

- Install a closed drainage system with catch basins with sumps and hood traps.

- Oil/water separators should be installed on any designated primary route, and designed to intercept and contain spills.

- Utilize outlet protection at the discharge from any drainage system point.

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- Install extended detention basins wherever feasible to reduce runoff rates, improve water quality, and promote recharge.

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RAIL AREA STORMWATER PLAN

The Devens Reuse Plan contains land uses that reflect federal government requests, enhancement of the site's natural resources, development of innovation and technology businesses, and development of rail-related industries. Because the infrastructure system developed over many years of Army use is extensive, the Devens Reuse Plan sought to maintain infrastructure, where possible, in its established location. The existing Rail Area, because it is located over a sensitive portion of the Aquifer and is adjacent to surface waters of Plow Shop and Grove Ponds, presents a challenge for water resource protection planning.

PURPOSE

The Water Resources Protection Plan for Devens calls for a specific stormwater control plan to be provided for the Rail/Industrial area, including an area-wide stormwater management system designed to improve water quality. For the Rail-Related Use Area, specific controls and design measures have been proposed to provide compatibility with and protection of existing water resources. These controls and design measures allow the generation, transportation, storage, and treatment of hazardous waste, associated with the ongoing operations of rail/industrial and trade-related businesses, while providing necessary protection to existing water resources. Acknowledging the sensitivity of the site, efforts must be made to mitigate existing conditions which threaten the ground water, and to establish best management practices using the best available technology to prevent future contamination.

SOURCES OF STORMWATER CONTAMINANTS IN THE RAIL AREA

Potential contaminants from railroad yards and maintenance areas include acids, bases, chloride, metals, nitrate, pesticides and herbicides, phenols, sodium, sulfate, surfactants, and VOCs. The B&M/Springfield Terminal Railway Company owns and operates a rail yard (the Hill Yard) adjacent to the Industrial Zone of the Main Post, in proximity to Grove Pond. The B&M Railroad has been identified as a potentially responsible party for a spill area along the rail line between Plow Shop and Grove Ponds.

BEST MANAGEMENT PRACTICES

Portions of the Rail-Related Use Area lies within Watershed, Aquifer and Zone II Water Resource Protection WRP Districts. All provisions mentioned above which apply to the WRP Districts apply to the respective portions of the Rail-Related Use Area, with the exception that the Rail Area provisions allow generators of hazardous waste beyond the level of Very Small Quantity Generators (VSQGs). The following site-specific BMPs have been established for the Rail-Related Use Area:

- On-site disposal of hazardous wastes is prohibited,
- Detention, treatment, and on-site recharge for pavement and roof runoff to hold peak rates below current rates, must be provided,
- The stormwater system must be designed to intercept and isolate potential spills and provide for timely clean-up,
- Response capabilities to respond to releases must be provided on-site,
- The stormwater treatment system must be designed to preserve and improve current water quality conditions,
- The area-wide stormwater system designed for the Rail Area must be phased in, in advance of sites as they are developed.

Because this is a common system maintenance will be provided by the Land Bank as the provider of Municipal Services.

FUTURE PLAN DEVELOPMENT

In advance of development, the Land Bank will provide detailed design and supporting calculations for the rail area drainage system. The system will be designed to be implemented in phases. Once constructed, Land Bank will conduct regular monitoring, inspection, and maintenance of the system to ensure that the system provides long-term protection of water quality.

DRAFT

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APPENDIX

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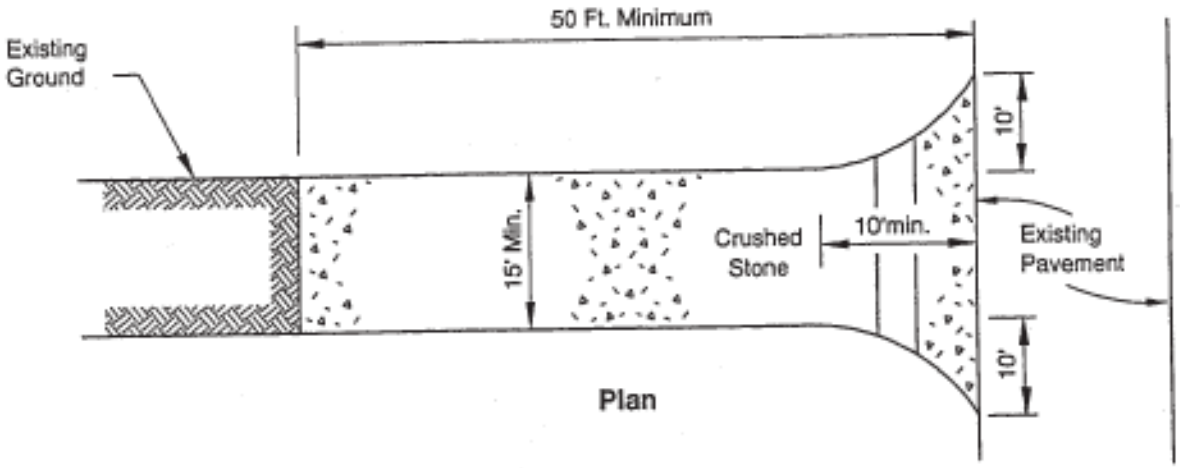
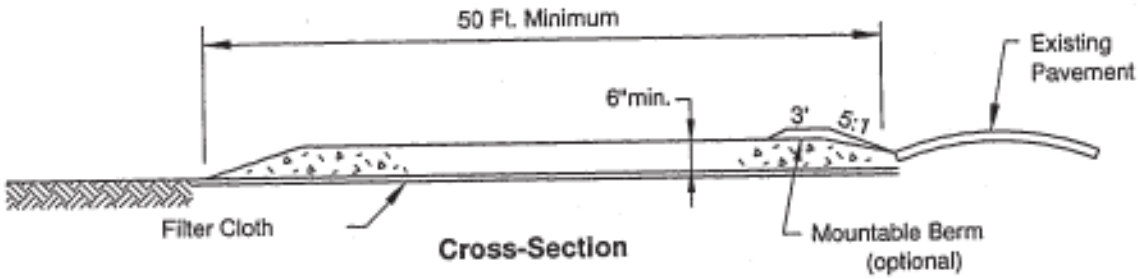




Construction Specifications

- Stone size - use 2" crushed stone.
- Length - recommend greater than or equal to 50 feet where soils are sands and gravels, and 100 feet in silts and clays.
- Thickness - not less than six (6) inches.
- Width - fifteen (15) foot minimum, but not less than the full width at points where ingress or egress occurs.
- Filter cloth - should be placed over the entire area prior to placing of stone.
- Surface water - all surface water flowing or diverted toward construction entrances should be piped across the entrance. If piping is impractical, a mountable berm should be permitted.
- Maintenance - the entrance should be maintained in a condition which prevents tracking or flowing of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand and repair or cleaning of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public rights-of-way must be removed immediately.
- Periodic inspection and needed maintenance shall be provided.

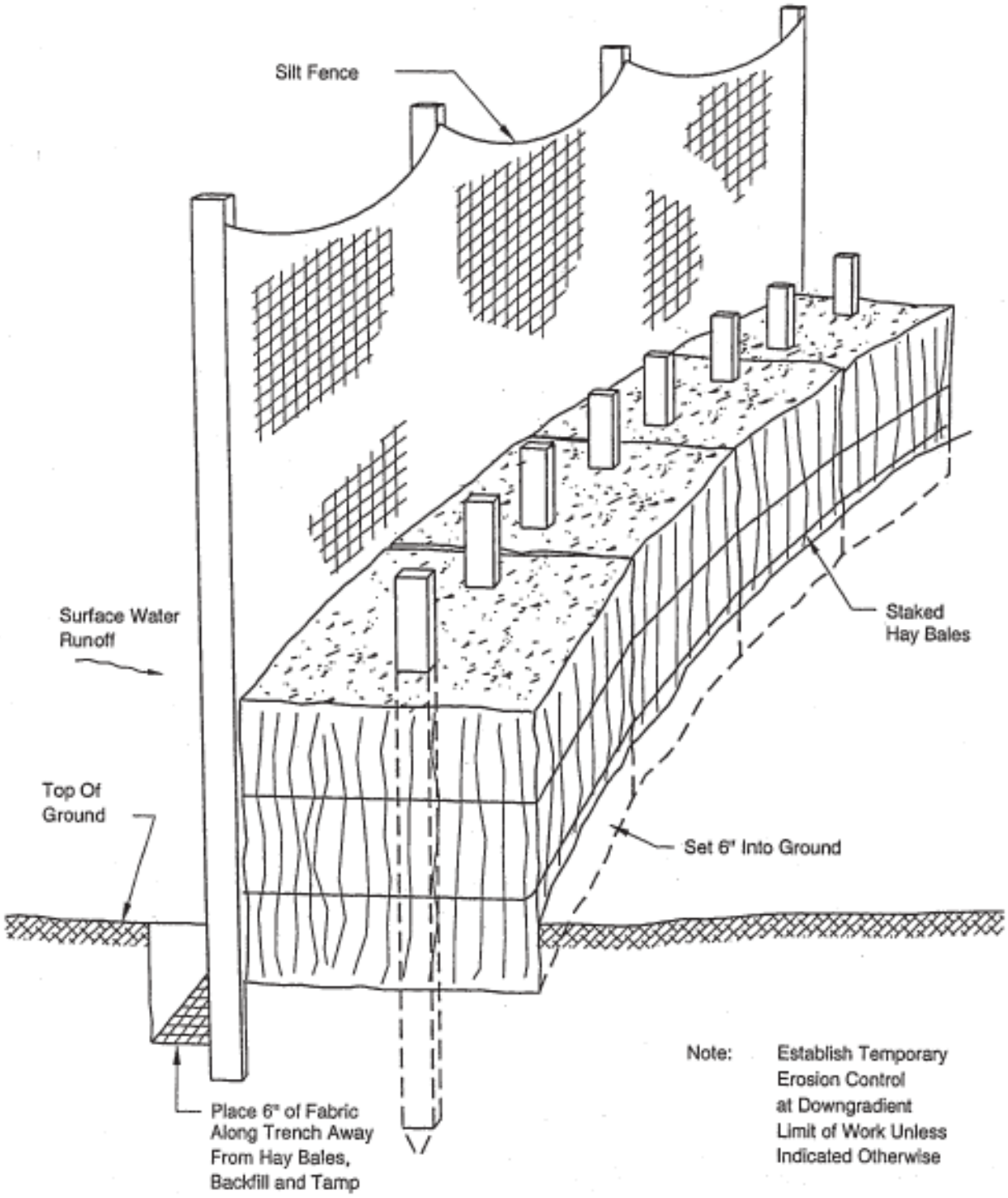
Not to Scale

DEVENS

Vanasse Hangen Brustlin, Inc.

Construction Tracking Pad

Figure A-1



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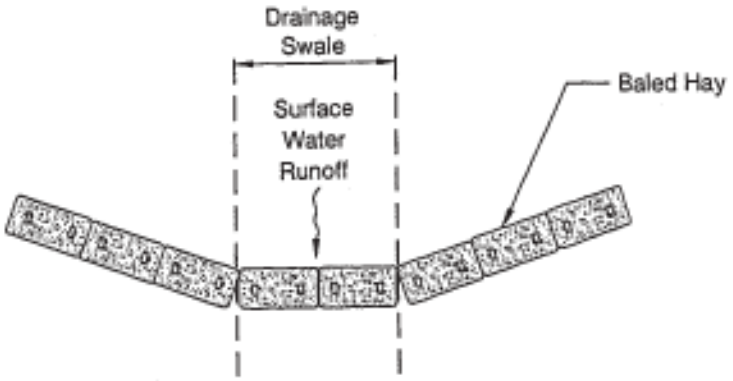
DEVENS

Vanasse Hangen Brustlin, Inc.

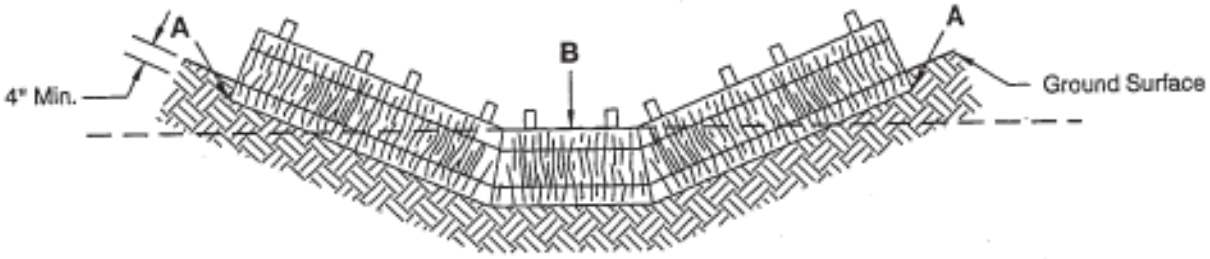
Staked Hay Bales and Silt Fence

Figure A-2

April 1995



Plan



Points A Should Be Higher Than Point B

Section

Not to Scale

Source: Installation of Straw and Fabric Filter Barriers for Sediment Control, Sherwood and Wyant.

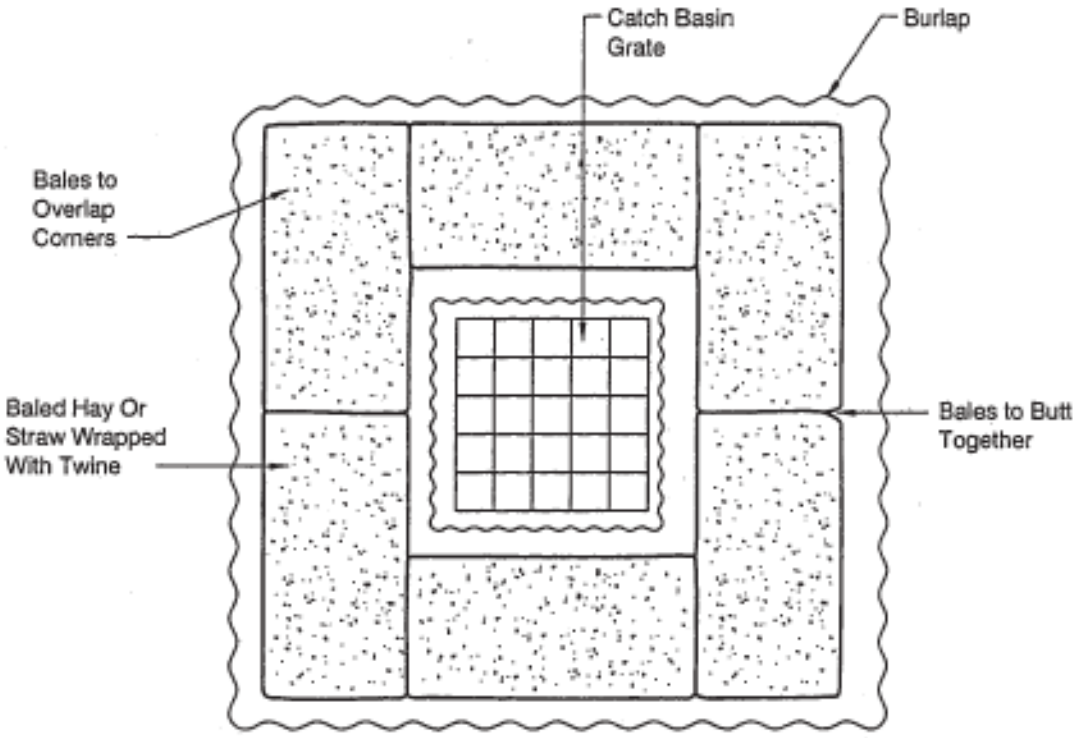
DEVENS

Vanasse Hangen Brustlin, Inc.

Proper Placement of Hay Bale Barrier
Check Dam in Drainage Way

Figure A-3

April 1995



- Surround street drainage structure inlet with hay bales prior to construction and maintain until construction is completed. Accumulated sediments shall be removed.
- Hay Bales placed on pavement should have burlap placed between pavement and hay bale.

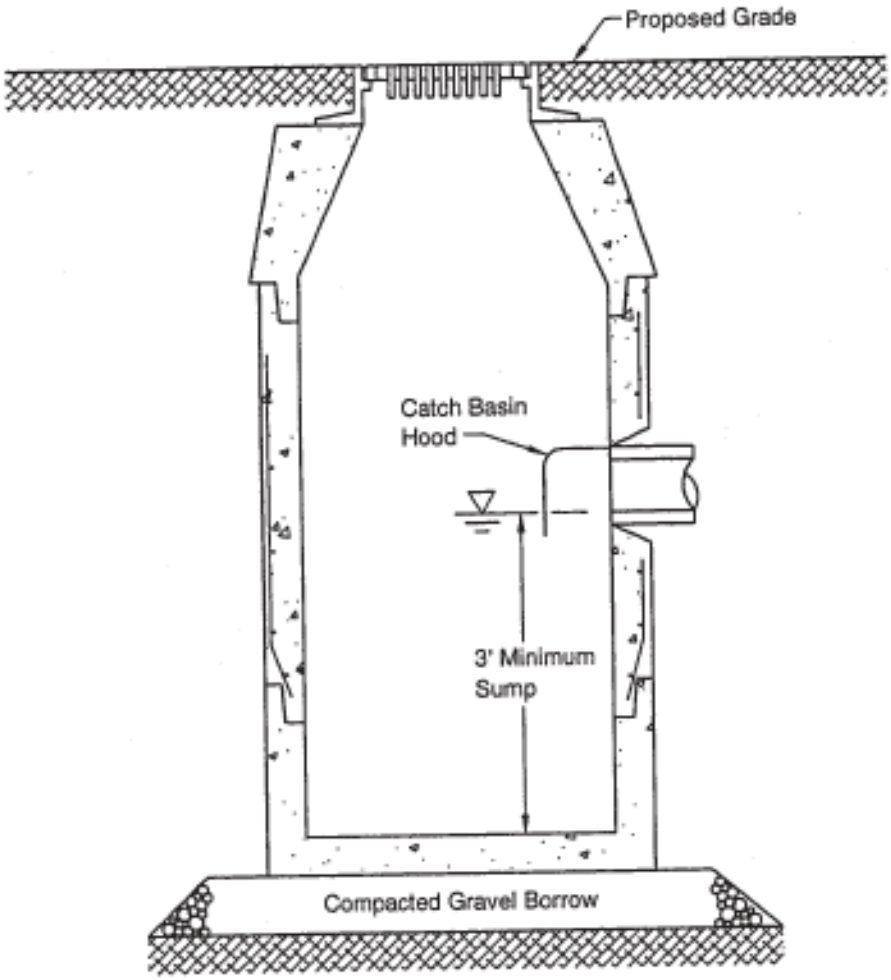
Not to Scale

DEVENS

Vanasse Hangen Brustlin, Inc.

Storm Drain Inlet Protection

Figure A-4



Design Criteria:

- 1/2 acre maximum tributary area.
- Capable of conveying the 25 year storm.
- 3 foot minimum sump for sediment removal.
- Outlet to be fitted with hoods to enhance sediment removal and enhance oil/water separation.
- Precast structure with tight joints to prevent leakage.
- Regular maintenance schedule.

Size:

- Standard 4 foot diameter catch basin with 3 foot sump..

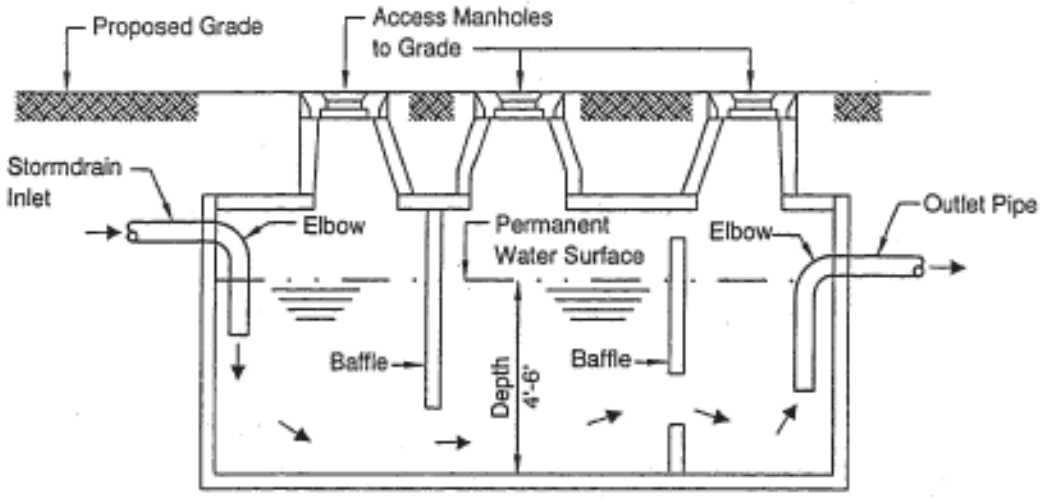
Not to Scale

DEVENS

Vanasse Hangen Brustlin, Inc.

Catch Basin

Figure A-5



Design Criteria:

- Capture the initial half inch of stormwater runoff from paved surfaces.
- Set off-line from the main stormwater trunk lines in conjunction with a diversion manhole.
- Overflow should be maintained in the main drainage trunk line.
- Three compartment watertight unit with an access manhole provided for each compartment.
- Sized to detain the runoff for a minimum of two minutes.
- Inverted elbow pipe extends 3 feet into permanent pool to adequately separate oil from water.
- Baffle plates installed from side walls to prevent resuspension and upward migration of sediments.
- Periodic removal of oil deposit to be accomplished by skimming/pumping.
  Tank must not be pumped dry.

Not to Scale

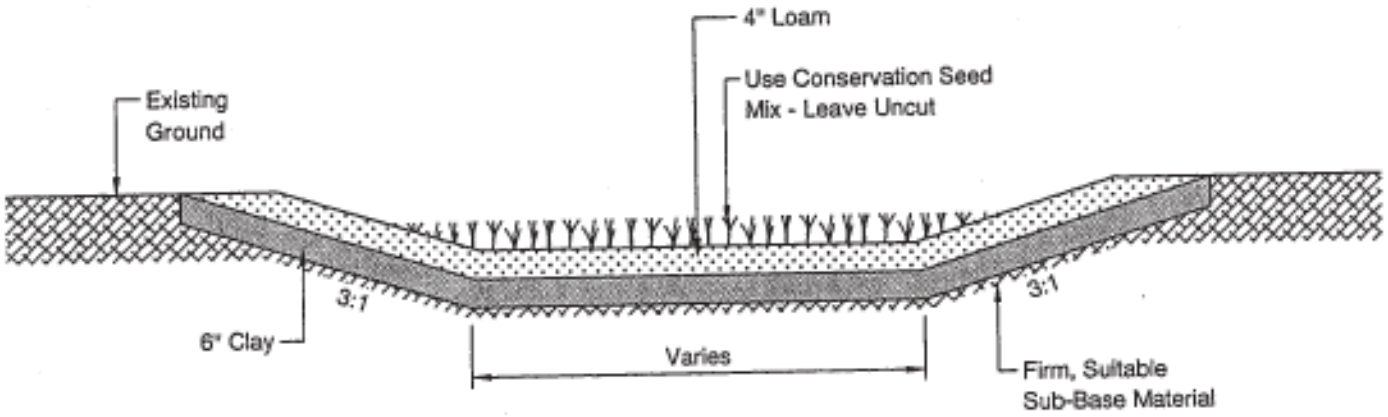
DEVENS

Vanasse Hangen Brustlin, Inc.

Oil / Water Separator
Three Chamber Design

Figure A-6

April 1995



Grassed Swale

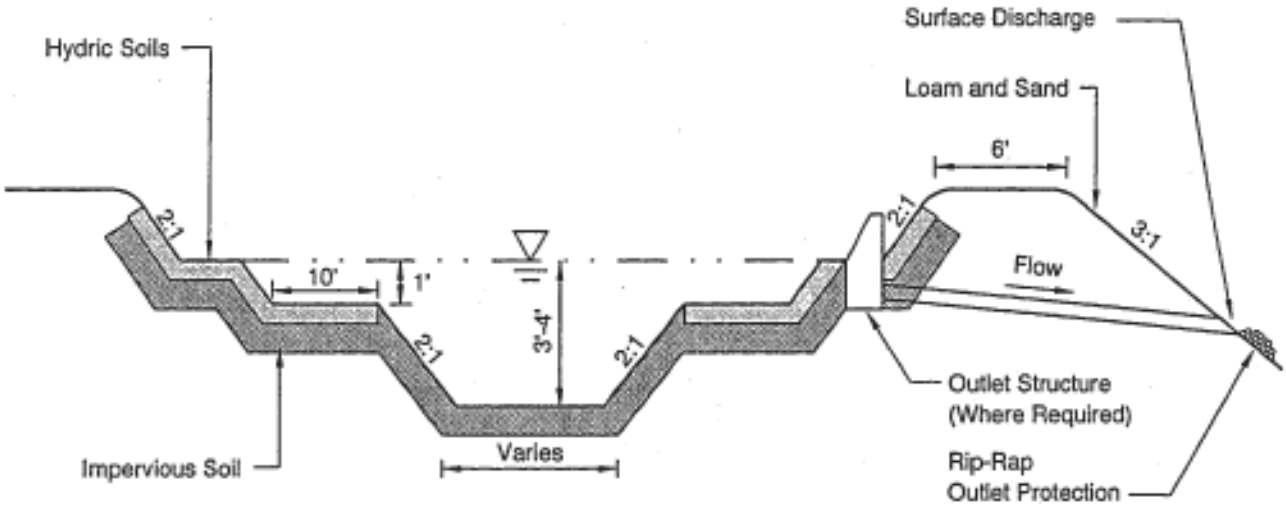
Not to Scale

DEVENS

Vanasse Hangen Brustlin, Inc.

Grassed Swale

Figure A-7



Design Criteria:

- Sized to maximize sediment removal by reducing runoff velocity allowing settlement.
- Bottom of permanent wet basin to be lined with an impermeable barrier to restrict exfiltration from basin.
- If basin is for use only during construction, impervious lining is optional.
- 3 to 4 foot average depth with a shallow underwater bench (10 feet wide) around the perimeter.
- Outlet sized to control the 100 year storm event.
- Provide over flow channel for storms, less frequent than 100 year.

Not to Scale

DEVENS

Vanasse Hangen Brustlin, Inc.

Cross Section of Typical
Wet Basin

Figure A-8

April 1995

DEVENS

Water Resources Protection Report

Prepared for

The Joint Boards of Selectmen

- **Town of Ayer**
- **Town of Harvard**
- **Town of Lancaster**
- **Town of Shirley**

The Massachusetts Government Land Bank

Prepared by

Vanasse Hangen Brustlin, Inc.
Watertown, Massachusetts
and
Haley & Aldrich, Inc.
Cambridge, Massachusetts

November 1994

WATER RESOURCES PROTECTION REPORT

Ayer, Harvard, Lancaster and Shirley, Massachusetts

Prepared for

The Massachusetts Government Land Bank
Joint Boards of Selectmen

Prepared by

Vanasse Hangen Brustlin, Inc.
101 Walnut Street
P.O. Box 9151
Watertown, Massachusetts 02272

and

Haley & Aldrich, Inc.
58 Charles Street
Cambridge, Massachusetts 02141

November, 1994

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Water Resources Task Force
Christine Chisholm, Nashua River Watershed Association
Savas Danos, Littleton Light and Water
John Guswa, Citizen of Harvard
Elizabeth Marten, Shirley Conservation Commission
E. Heidi Roddis, Massachusetts Audubon Society
Carolyn Sellars, Nashua River Watershed Association
Paul Susca, Nashua River Watershed Association
Lucy Wallace, Harvard Planning Board

Army Corps of Engineers
Susan Brown, EIS Project Manager

Army Environmental Center
Charles George
Major Gary Pease

Federal Base Realignment and Closure Commission
James Chambers, Environmental Coordinator
Robert Winter

Massachusetts Department of Environmental Protection
D. Lynne Welsh

Town of Ayer
William Redfield, Superintendent, Department of Public Works

Town of Harvard
David Smith, Sr., Chairman, Harvard Water Commission

Town of Shirley
Brian Goodman, Jr., Superintendent, Shirley Water Department

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INTRODUCTION

The preparation of a Water Resources Protection Report as part of the Devens reuse planning process has presented a unique opportunity for the Commonwealth of Massachusetts and Towns of Ayer, Harvard, Shirley, and Lancaster to develop a comprehensive management framework that protects ground and surface water resources while allowing active redevelopment of Devens. The information in this report is the result of input from the Water Resources Task Force, a group of private citizens and interest group representatives concerned with the protection and ongoing management of the water resources at Devens; data gathered by the Army in its preparation of the Environmental Impact Statement (EIS); guidance from the Massachusetts Department of Environmental Protection (MADEP), feedback from the public workshop process, and efforts by the Devens Reuse Center. The report was prepared for the Massachusetts Government Land Bank and the Joint Boards of Selectmen.

This report represents the final phase of water resources protection planning. It consists of an evaluation of existing water resources in the subwatersheds that encompass Devens, including the geology and ecology of the area. It reviews the water supply systems and protection measures currently in place for Devens and the Towns of Ayer, Harvard, and Shirley. The report identifies current and potential ground and surface water contamination sources, and discusses the watershed hydrology and exisiting water supply systems. For existing contamination sources, response measures that have been implemented are reviewed and additional measures are discussed. Protective measures that could be put in place to prevent potential contamination sources from impacting existing and/or future water supply are explored. Projections regarding potential future water supply development, and a risk assessment and management framework are included. The report concludes with the presentation of the Water Resources Protection Plan (WRPP), the culmination of water resources planning efforts over the past year.

PURPOSE

The communities that are affected by the closure of the Main and North Posts of Devens have expressed concerns about adequately protecting the supply of water from the aquifer underlying portions of the base. Therefore, water resource research and planning efforts were undertaken to formulate a Water Resources Protection Plan to protect this vital resource. Because the protection of groundwater resources is linked to surface water quality, the WRPP includes all areas of Devens and deals with both surface and ground water resources.

The purpose of this report is to present the findings of the research and planning efforts which guided the development of the WRPP, and to present the final WRPP to enable the communities, citizens, special interest organizations and state agencies to make informed decisions on the development of the Devens Regional Enterprise Zone, Water Resources Protection Bylaws. These Bylaws will ultimately be developed into regulations which will guide the implementation Reuse Plan.

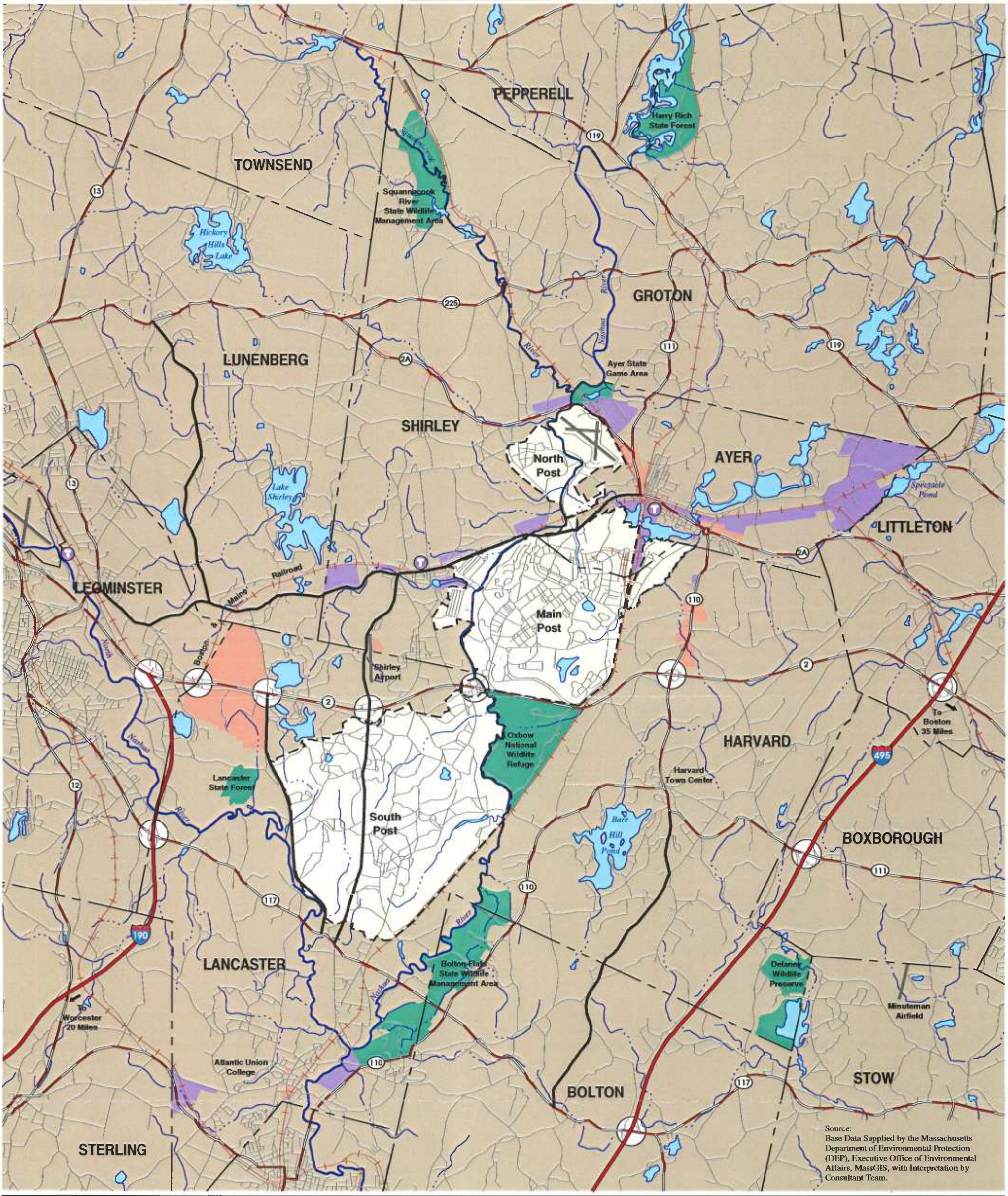
BACKGROUND

Devens is in the north central region of Massachusetts, bordered by the Towns of Ayer and Shirley in Middlesex County and the Towns of Harvard and Lancaster in Worcester County (see Figure 1). When Fort Devens was established in 1917, the surrounding municipalities were required to surrender control of over 9,300 acres of land to the military. Since that time the land has been used by the U.S. Army and, as a result, has been extensively developed. Today Devens resembles a small city with a daytime population in recent years of approximately 15,000 people.

Devens is composed of three distinct land areas commonly referred to as the Main, North, and South Posts. Portions of the Main and North Posts which total approximately 4,400 acres, will be deactivated in 1995 as a result of the 1991 recommendation by the Federal Base Realignment and Closure Commission. South Post, approximately 4,900 acres south of Route 2, will remain under the control of the U.S. Army to be used for training purposes.

Although the population has fluctuated over time, Devens developed the necessary infrastructure to support a population of 30,000. The installation has evolved into a self-sufficient community with over 7 million square feet of building plus ancillary facilities. Because Devens was designed to operate in a self-sufficient manner, the infrastructure and public works facilities, including water supply and distribution, were separate from the surrounding communities.

Historic operations at Devens required the use of underlying aquifers for water supply. Today four wells draw water from this aquifer to supply the installation, however only three of these wells are currently active. The Army's development of the land has resulted in extensive impervious surfaces over the aquifer and surrounding watersheds, with few measures taken to protect water quality or recharge runoff to the ground. Extensive areas of potential and existing contamination have been found in areas overlying the aquifer. The Devens Water Resources Protection Plan, developed by the Joint Boards of Selectmen, Harvard, Shirley, Ayer and the Land Bank, addresses ways in which future uses of Devens can maintain increased protection of the aquifer and provides guidance on protection of the aquifer during site cleanup and development.



- Federal or State Conservation Area
- Industrial *(Proposed or Existing)*
- Commercial/Business *(Proposed or Existing)*
- Existing Fort Devens Reservation
- River
- Town Boundary
- Interstate Highway
- Major Road
- Railroad Line
- Commuter Rail Station

EDAW / VHB

LAND BANK

Devens Base Reuse Center

Ayer • Harvard • Lancaster • Shirley

Figure 1
Regional Context

November, 1994

0 3500 7000 Feet

15 130 Acres

REGMAP

WATERSHED CHARACTERISTICS

The following section describes the existing watershed characteristics of the portion of the Nashua River Watershed that encompasses Devens, including the underlying geologic deposits, existing natural systems, and the potential contamination sources. This information is used to develop management strategies to protect the ground water resources at Devens.

GEOLOGIC SETTING

The site is just east of the Worcester County Plateau within the Upland Subprovince of the New England Physiographic Province. Bedrock in the region consists of low to medium grade quartzofeldspathic metamorphic rocks, which are highly folded in some areas. Bedrock units underlying Devens include the Worcester, Oakdale, Berwick, Chelmsford Granite, and Ayer Granite Formations. The site is approximately 2 miles west of the Clinton-Newbury/Bloody Bluff Fault Zone, which follows a northeast-southwest trending arc across eastern Massachusetts. Depth to bedrock is generally fairly shallow in the upland areas, and is generally greatest near the center of the Nashua River valley, and along the valleys of the tributaries to the Nashua. Surficial geologic deposits are dominated by stratified glacial deposits associated with the drainage of Glacial Lake Nashua; and glacial till, a dense, heterogeneous mixture of boulders, cobbles, gravel, sand, and silt, which was deposited directly on bedrock by glacial ice as it advanced over the region during the Pleistocene Period (approximately 10,000 to 12,000 years ago). The stratified deposits include glacial outwash deposits and glaciolacustrine deposits, which are found in broad, low-lying areas, and along many river and tributary valleys (1,2,3,4).

The glacial outwash deposits generally consist of coarse to fine sand and gravel. These materials were deposited by glacial meltwater streams, which generally drained east and south as the ice receded to the north, exposing outlets for the various stages of Glacial Lake Nashua (4). The thickest sequences (up to 200 ft.) of these deposits are typically found along a bedrock valley that is parallel to, and slightly west of, the Nashua River (5). Glaciolacustrine deposits are typically fine-grained, comprised of fine sand, silt, and clay which settled out of the still waters of the deeper portions of Glacial Lake Nashua.

Surface Water

Devens is within the 538 square mile Nashua River Basin. The Nashua River flows along the western border of the Main Post, and bisects the North Post. It flows from south to north through Devens to the Merrimac River at Nashua, New Hampshire. The Massachusetts DEP has classified the Nashua River as a Class B waterway, suitable for swimming and fishing.

Tributaries to the Nashua River within Devens include: Cold Spring Brook, Bowers Brook, Willow Brook, and Nonacoicus Brook. Willow Brook has been extensively channelized and culverted over the years. The Nashua River also receives surface water flows from the west via Catacoonamug Brook, Trout Brook, and Walker Brook. Open waters on or near the site include Mirror Lake and Little Mirror Lake, Robbins Pond, Plow Shop Pond, and Grove Pond.

Wetlands

The Nashua River and its tributaries are important wetland resources for the region. The majority of wetlands on the Main and North Posts are Palustrine forested wetlands occurring along the stream and floodplain corridors. Also present are flood oxbows, emergent wetlands, shrub wetlands, and a small area of red spruce bog. Based on digital mapping supplied by the DEP and reported in the EIS, these wetlands, including open water, total approximately 438 acres.

In addition to their important water quality and stormwater management functions, these wetlands have been found to have significant wildlife resources by the U.S. Fish and Wildlife Service (USFWS). The USFWS has moved to further protect these resources by requesting land for expansion of the Oxbow National Wildlife Refuge and including land along the Nashua River corridor. These wetland resources represent an opportunity for open space, habitat and recreation purposes.

Vegetation

The transformation of the Devens landscape from its early twentieth century agricultural use to its current developed land areas and successional forest cover types is the result of Army facilities development and forest management practices. The Main and North Posts contain a variety of vegetation types that can provide diverse landscape settings for reuse, development, recreation, and open space.

The Main and North Posts are dominated by developed land cover types associated with the Army cantonment and airfield areas. The vegetation patterns are typically campus-like with open lawns and mature specimen trees associated with various building complexes, interspersed with forest areas in various stages of succession. Other major open areas include the golf courses, Rogers Field parade grounds and open areas in the industrial precinct. Much of the forest cover coincides with the Nashua River floodplain and the various stream corridors that course through the site.

Rare and Endangered Flora and Fauna

The U.S. Army Corps of Engineers has recently prepared a biological and endangered species baseline study of Devens. According to this study, there is no known occurrence of federally listed threatened or endangered plant or animal species on the North or Main Posts.

There are areas of potential habitat for rare and endangered flora and fauna under the Commonwealth of Massachusetts Endangered Species Act. Approximately 430 acres of the Main and North Posts are potential habitat for rare and endangered flora and fauna. The majority of the potential habitat occurs in areas that are currently protected by wetlands regulations, or in areas along stream corridors and the Nashua River floodplain that are proposed for inclusion in the USFWS property requests.

POTENTIAL CONTAMINATION SOURCES

Devens is a National Priority List (NPL) site, a Comprehensive Environmental Response Compensation, Liability Information System (CERCLIS) site and a confirmed Massachusetts Department of Environmental Protection (DEP) disposal site. The site was added to the final NPL list on November 21, 1989, and became a confirmed, state-listed disposal site on October 15, 1989. Soil, ground water and surface water have been contaminated with heavy metals, VOCs, petroleum products, asbestos and explosive residue from 59 separate source areas, identified as of December 1993. Source areas include an 8 acre maintenance yard, a 50 acre sanitary landfill, historic gas stations, and a firefighter training area. Areas of Contamination (AOCs), Study Areas (SAs), and Base Realignment and Closure (BRAC) Cleanup Sites at Devens are shown in Figure 2. These designations are based on an Army database dated December 1993.

A potential contamination source in the region is stormwater runoff from private and public roads, including Route 2, which borders the southern boundary of the Main Post. Stormwater runoff contributes nutrients, dissolved and suspended solids, heavy metals, sodium chloride, and low concentrations of volatile organic compounds (VOCs) to surface water and ground water resources (6). More importantly, if containment structures are not in place, stormwater drainage systems can provide a conduit for transport of oil or hazardous material in the event of an accident.

Potential contaminants from railroad yards and maintenance areas include acids, bases, chloride, metals, nitrate, pesticides and herbicides, phenols, sodium, sulfate, surfactants, and VOCs (6). The B&M/Springfield Terminal Railway Company owns and operates a rail yard (the Hill Yard) adjacent to the Industrial Zone of the Main Post, in proximity to Grove Pond. The B&M Railroad has been identified as a potentially responsible party for a spill area along the rail line between Plow Shop and Grove Ponds (7).

The Moore Airfield, on the North Post, is a potential contamination source given that airports typically have fuel tanks and solvent storage areas for aircraft service and maintenance. Runoff from airports commonly contains metals, pesticides and herbicides, VOCs, and surfactants (6).

Devens' sanitary sewer service areas are shown in Figure 3. Leakage from municipal sewer lines can be considered a threat to public water supply, where piping is old and in poor condition. Sanitary sewers at Devens are reported to be in good condition and therefore are not expected to influence water quality. Sewage from Devens flows to the wastewater treatment plant west of the Nashua River on the North Post. The system discharges primary-treated wastewater to open-air rapid sand infiltration beds, which recharge the effluent to the ground. Common contaminants that may be contributed by municipal sewage include metals (including iron and manganese), nitrate, pathogens (viruses and bacteria), sodium, solvents, and surfactants (6).

The South Post, which is partially in the North Nashua watershed, is not part of the Reuse Plan, but reportedly, spills of petroleum, oil and lubricants occurred where fueling or fuel storage was involved in training exercises (7). Two landfill sites, which received household waste prior to 1930 are also on the South Post (7).

In addition to the above, seven state-listed confirmed disposal sites are within one half mile of Devens (8), as shown in Figure 2. The regulatory status of the sites and the types of contaminants encountered are summarized below:

A. FMC/Tulco, Inc., 9 Bishop Rd, Ayer: Priority disposal site in Phase II (Comprehensive Site Assessment Phase) of the MCP (confirmation date: 15 January 1987). Soil and ground water were contaminated with arsenic, organics and pesticides from a landfill and pit.

B. Exxon gas station, 20-30 Park St, Ayer: Priority disposal site in Phase I (Initial Site Assessment Phase) of the Massachusetts Contingency Plan (MCP) (confirmation date: 15 July 1993). Soil and ground water were impacted from a leaking underground storage tank (UST).

C. Mr. Mike's Citgo, Harvard Rd, Ayer: Priority disposal site in Phase II of the MCP.

D. Calahan Property, 262 Ayer Rd, Harvard: Unclassified site in Phase I of the MCP. Soil and ground water were contaminated with volatile organic compounds from a leaking UST and other identified source(s).

E. Shirley Highway Department, 26 Clark St, Shirley: Unclassified site in Phase I of the MCP (confirmation date: 15 July 1993). Soil was contaminated by gasoline from a leaking UST.

F. Samson Ocean Systems, Inc., Shaker Rd, Shirley: Published non-priority site in Phase II of the MCP (confirmation date: 15 April 1987). Soil and ground water were contaminated with metals, petroleum products and volatile organic compounds from unidentified sources.

G. MCI Shirley Department of Correction, Harvard Rd., Shirley: Unclassified site in Phase I of the MCP (confirmation date: 15 July 1993). Soil and ground water were contaminated with petroleum products from a leaking UST.

Confirmed DEP Disposal Site C which is proximate to the limit of the aquifer areas, is approximately one half mile south of Grove Pond, and is likely upgradient of the Grove Pond area. While Site D may also be upgradient, it is

NORTH POST	
ARMY AREA	10%
ZONE II AREA	20%
AQUIFER AREA	90%

NASHUA RIVER	
ARMY AREA	15%
ZONE II AREA	5%
AQUIFER AREA	20%

WILLOW BROOK	
ARMY AREA	0%
ZONE II AREA	15%
AQUIFER AREA	55%

INDUSTRIAL	
ARMY AREA	0%
ZONE II AREA	35%
AQUIFER AREA	80%

MIRROR LAKE	
ARMY AREA	35%
ZONE II AREA	45%
AQUIFER AREA	60%

NORTH POST ZONE
NASHUA RIVER ZONE
WILLOW BROOK ZONE
INDUSTRIAL ZONE
MIRROR LAKE ZONE
WHITTEMORE HILL ZONE
SHIRLEY
AYER
HARVARD
LANCASTER
Moore Airfield
Oxbow National Wildlife Refuge

Source:
Base Data Supplied by the Massachusetts Department of Environmental Protection (DEP), Executive Office of Environmental Affairs, MassGIS, with Interpretation by Consultant Team.

- Study Areas (SA)
- Areas of Contamination (AOC)
- No Further Action (NFA)
- BRAC Closure Actions (NFA - CERCLA)
- State Listed Confirmed Disposal Sites
- Department of Defense Enclave
- Approximate Limits of Aquifer
- CERCLA SA's & AOC's in Vicinity of Shepley's Hill Landfill
- Zone Lines
- Zone II Safe Yield Pumpage, ETA 1994
- Zone II Permitted Pumpage, ETA 1994

Note:
The number of AOC's, SA's, NFA's NFA's-Closure required, based on AEC database, December 1993.

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Devens Base Reuse Center
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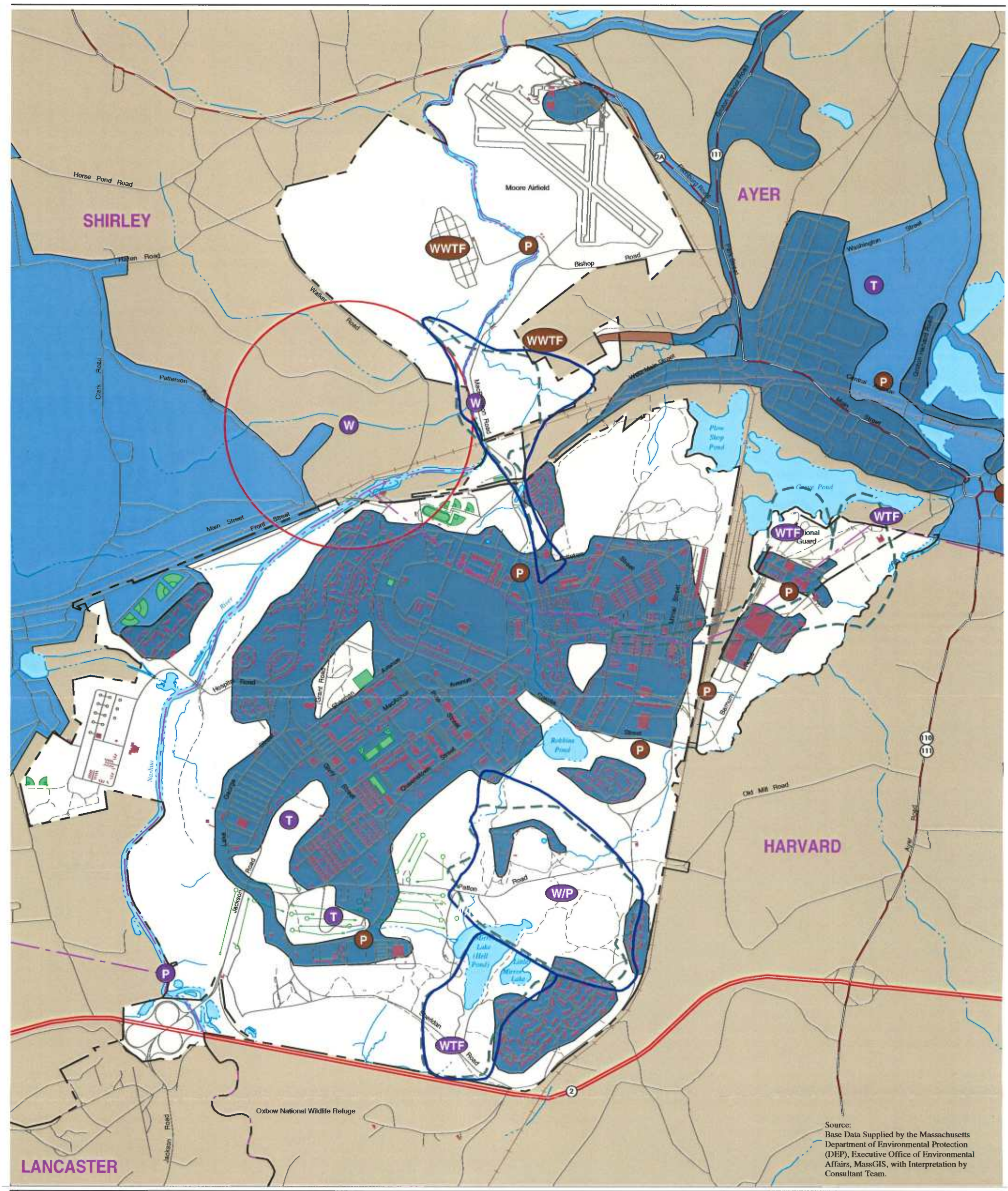
Figure 2
Reuse Implications From Superfund Sites & Aquifers

November, 1994

0 1000 2000 Feet

1 10 Acres

3598SUP



WWTF Wastewater Treatment Facility

P Sanitary Sewer Pump Station

WTF Well and Water Treatment Facility

P Water Pump Station

W Well

T Water Tank or Standpipe

Region Serviced by Both Water and Sewer Systems

Region Serviced by Public Water System

Region Serviced by Sanitary Sewer System

Zone II Safe Yield Pumpage, ETA 1994

Zone II Permitted Pumpage, ETA 1994

Interim Zone II

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Figure 3
Water & Sanitary Sewer Service Areas

November, 1994

0 1000 2000 Feet

1 10 Acres

3598WS

within the till/bedrock areas, and is over one mile from Grove Pond, and therefore unlikely to be a significant source of contamination.

Erosion of steep, poorly vegetated slopes can result in siltation of surface water bodies, but is generally not regarded as a potential threat to ground water supplies. In general, the site is not characterized by steeply sloping topography. Areas with slopes that are greater than 15 percent include the Nashua River corridor, Shepley's Hill, and the southeast portion of the Main Post, in the Mirror Lake/Robbins Pond region, and just south of Cutler Army Hospital. These areas generally are forested, except for a gravel mining operation on the western banks of Big Mirror Lake (7).

While extensive sources of potential contamination have been identified at and near Devens, minimal impact on water quality at the on-site water supply wells has been identified, based on water quality data collected to date. In future water supply planning work, locations of USTs and other Confirmed Disposal Sites or Locations To Be Investigated (LTBIs) in aquifer areas may be further documented, if additional water supply well sites are to be investigated. Care will have to be taken during site cleanup and future development to avoid contamination of ground water resources. Measures to promote continued protection of the water resource are provided later in this report.

GROUND WATER PROTECTION DURING REMEDIATION

There is general concern that remediation measures may adversely impact the aquifer. Remediation measures implemented in aquifer areas should be undertaken in a manner that will minimize potential impacts on the underlying aquifer, and impacts to surface water runoff that drains into the aquifer. As on-going remediation efforts continue, we recommend inclusion of the following components in management plans geared toward aquifer protection:

- Description of the site history and site conditions including types of contaminants encountered, concentrations and standards, and lateral and vertical extent of contamination.

- Field screening and analytical methods for evaluating contaminant levels in soil and ground water.

- Decontamination methods for personnel and equipment, designated decontamination areas, and containerization methods for contaminated clothing and wash water.

- Criteria for segregating contaminated soils, and methods for containing the soils. For example, excavated contaminated material should be stockpiled and covered with impervious material, or transferred to covered rolloff containers. In addition, open excavations should be covered so that precipitation will not reach excavated areas.

- Methods for treating or containerizing contaminated water generated on projects where dewatering is required.

- Methods for controlling runoff during site remediation. For example, sediment transport in surface water runoff from remediation sites should be

mitigated by typical siltation controls such as placement of hay bales and silt fence between the work areas and surface water bodies.

- Criteria for evaluating reuse, treatment and disposal options for contaminated soil and ground water.

- List of applicable local, state, and federal regulations, and referenced documents.

On contaminated sites where remediation may not be practical or feasible, aquifer protection measures could include capping contaminated areas to prevent infiltration of precipitation through contaminated soils. To maintain or increase aquifer recharge rates at these sites, runoff from the capped areas could be directed to on-site recharge basins in areas underlain by clean soil or fill materials. Installation of oil/water separators at recharge basins or stormwater discharge points could also be implemented on contaminated sites where runoff may contain petroleum or solvent compounds.

PROPOSED REUSE PLAN

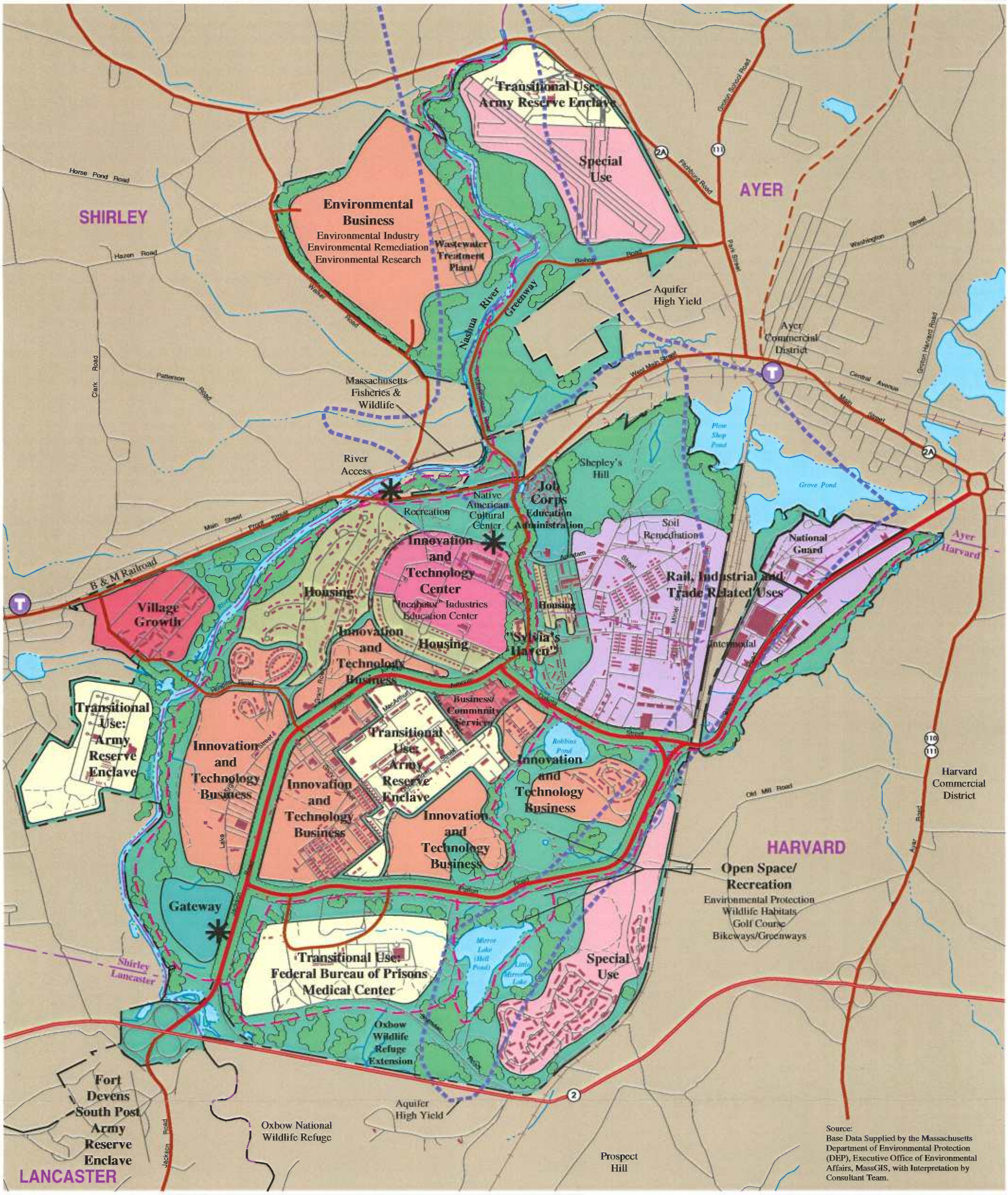
The Reuse Plan for Devens offers a program that balances the protection and enhancement of the natural resource base with the provision for economic opportunity for this region of Massachusetts. The Reuse Plan contains land uses that reflect federal government requests, enhancement of the site's natural resources, development of innovation and technology businesses, and development of rail-related industries. Taking advantage of an existing system of infrastructure and access, the Devens Reuse Plan (Figure 4) proposes a mix of land uses that will generate employment opportunities. In addition, the plan incorporates the needs and interests of the federal, state, and local governments.

Land Use

The inclusion of open space zones, innovation and technology business areas, rail-related/industrial uses, residential areas, and a variety of other uses in the Reuse Plan, reflects the commitment to diversity. The open space system presented in the Reuse Plan, includes all land proposed for active and passive open space, as an integrated network of open space, rather than one managed by individual land owners. A water resources protection plan has been developed and will be implemented for all uses that locate on Devens regardless of whether they occupy land over the medium and high yield aquifers.

Open Space

The Reuse Plan provides for the retention of over 33 percent of the site as dedicated open space. The open space system provides protection to Devens' environmentally sensitive areas and encourages the creation of active and passive recreational areas throughout the site. A north to south open space corridor along the Nashua River is proposed as part of the request of the USFWS to acquire the river's associated floodplain. The USFWS also has requested the parcel to the north of Route 2. Both land areas will become an extension of the Oxbow Wildlife Refuge. An open space "necklace" is created by extending open space northerly around Mirror Lake and along Willow Brook,



- Open Space & Recreation
- Innovation & Technology Business
- Rail, Industrial & Trade-Related Uses
- Environmental Business
- Housing
- Business/Community Services
- Transitional Use Army Reserve Enclave & Federal Bureau of Prisons Medical Center
- Innovation & Technology Center
- Gateway
- Special Use
- High Yield Aquifer
- Conceptual Trails & Bikeways
- Commuter Rail

Note:
See Parcel Maps for Delineation of Zoning Districts.

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Devens Base Reuse Center
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Figure 4
Devens Reuse Plan

November, 1994

0 1000 2000 Feet

1 10 Acres

connecting to the recreation areas near the Verbeck Gate. As a result, an open space system is created with a variety of natural and man-made features along its course.

The Reuse Plan calls for the development of an open space plan within one year after adoption. As part of this plan, active and passive recreation areas will be identified and sensitive resources such as valuable wetlands will be studied and mapped. Legal methods will be identified and implemented to place permanent protection on these sensitive resources.

Devens and the surrounding area are within the Upland Subprovince of the New England physiographic province, and are characterized by gently rolling terrain intersected by the Nashua River and several smaller stream valleys. The geology of the Upland Subprovince consists of unconsolidated glacial till and outwash deposits overlying folded and faulted bedrock. Throughout a significant portion of Devens and the surrounding area, these unconsolidated glacial deposits have proved conducive to the development of highly productive aquifers. Devens and the Towns of Ayer and Shirley all obtain their potable water supply from these aquifers.

WATERSHED BOUNDARIES AND DRAINAGE PATTERNS

Devens lies within the Nashua River drainage basin, which occupies approximately 538 square miles in central Massachusetts and south-central New Hampshire. The Nashua River is made up of two main branches, the North Branch and the South Branch, which merge just south of Lancaster in the vicinity of the Devens South Post, to form the Main Stem. The Main Stem flows northward, towards Nashua, New Hampshire, where it discharges into the Merrimac River. The Nashua River watershed is subdivided into twenty subwatersheds. The three subwatersheds that encompass Devens include: the North Nashua, the Main Stem, and the Bowers Brook/Nonacoicus subwatershed (see Figure 5). According to 314 CMR 1.00-7.00, the Nashua River has been classified as a Class B waterway, suitable for fishing and swimming.

The North Nashua watershed extends from West Fitchburg, where the North Nashua originates, to Lancaster, where it meets with the South Branch. Tributaries along the segment of the river that originate near or on the South Post include McGovern Brook, Spectacle Brook, and Ponakin Brook (which originates on the South Post). Surface water bodies include Little Spectacle Pond, Spectacle Pond and Oak Hill Pond (a kettle pond on the South Post). The 7-day low flow (with a 10 percent annual probability) of the north branch of the Nashua River at a stream gauging station in Leominster is reportedly 35 cubic ft. per second (cfs) (5).

The Main Stem subwatershed extends from the convergence point of the south and north branches northward to Nashua, New Hampshire. Devens abuts the southern third of this subwatershed (from the convergence point of the North and South Branches to the discharge point of Mulpus Brook). The South Branch provides water to the Wachusett Reservoir, located south and upstream of Devens. Flow of the South Branch, downstream of the reservoir, is approximately 12 million gallons per week (on average approximately 2.6 cfs),

which is released from the reservoir by the Metropolitan District Commission (MDC) under a mandate established when the reservoir was constructed. The Main Stem flows northward through the South Post proximate to the Oxbow National Wildlife Refuge and along the western border of the Main Post and bisects the North Post. Tributaries along this segment include the Still River, three unidentified streams (which originate on the South Post), Catacoonamug Brook, Trout Brook, Walker Brook, Nonacoicus Brook, Mulpus Brook, and the Squannacook River. The only pond in this portion of the subwatershed is Cranberry Pond, which is a kettle pond on the South Post. The 7-day low flow reported for a stream gauging station on the Main Stem, approximately 4 miles north of the site in Pepperell, is 43 cfs (5).

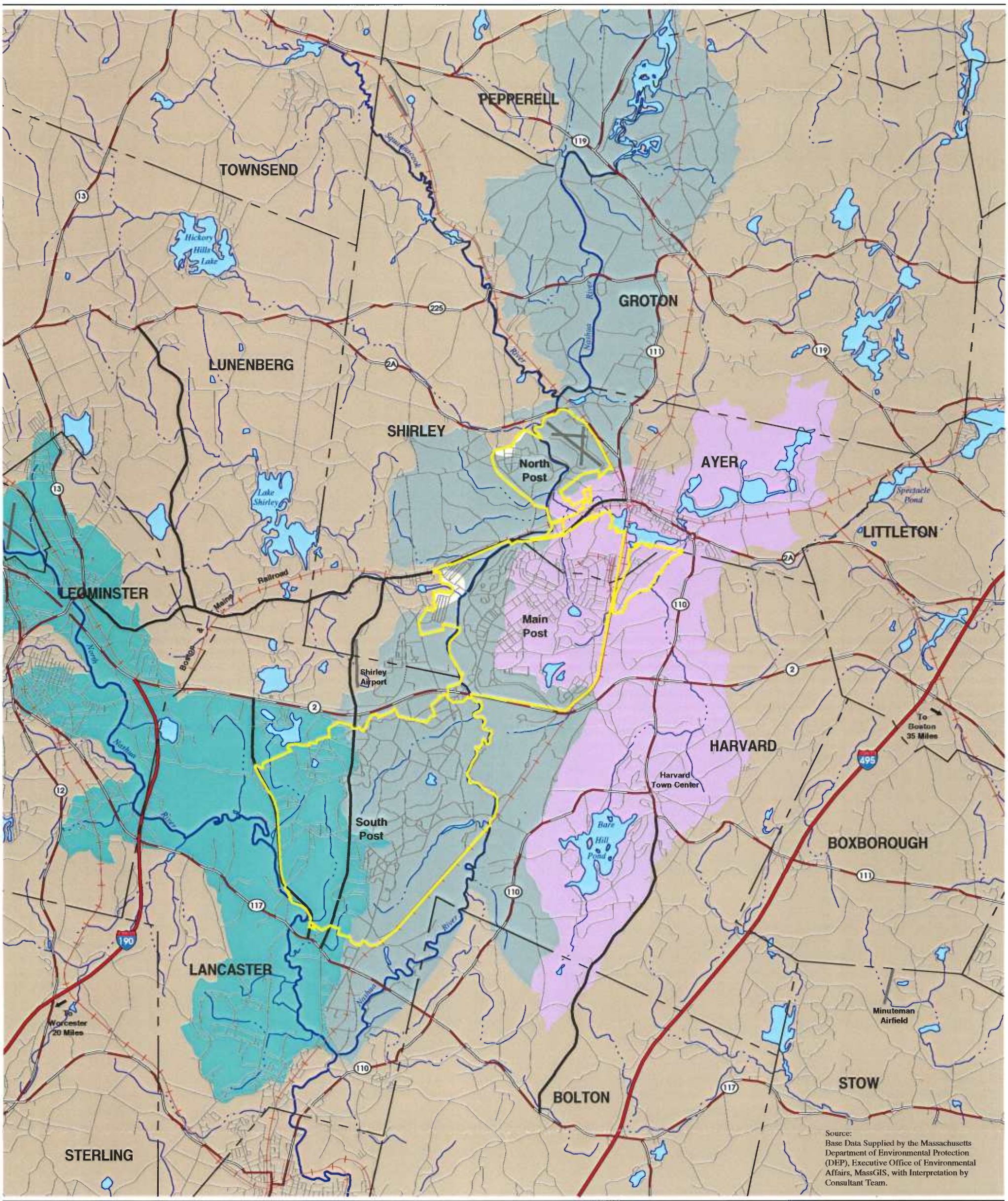
The flow rate at this gauging station is affected by storage of water behind dams, such as the Ayer Ice House dam, which is located upstream of the Pepperell gauging station near the northern tip of the Main Post at Fort Devens. The Ice House dam is not actively used to generate electricity; however, it does restrict stream flow, affecting the streamflow duration characteristics of downstream gauging stations.

The Bowers Brook/Nonacoicus (BB/N) subwatershed extends from the Vaughn Hills in the south (where Bowers Brook originates), to Long Pond in the east, and to the confluence of Nonacoicus Brook and the Nashua River in the west. Nonacoicus Brook receives flow from Willow Brook and from a series of interconnected ponds - Plow Shop Pond, Grove Pond, Flannagan Pond, and Sandy Pond. Bowers Brook, which originates south of Harvard and Bare Hill Pond, flows through Bare Hill Pond and discharges into Cold Spring Brook, which flows in a northeasterly direction until it discharges into Grove Pond. Other surface water bodies in the BB/N subwatershed include Robbins Pond, Mirror Lake, and Little Mirror Lake on the Main Post. Robbins Pond drains into Willow Brook. Mirror Lake and Little Mirror Lake are isolated kettle ponds, which have no connection to the various tributaries. The 7-day low flow reported for Nonacoicus Brook near its confluence with the Nashua River is 0.3 cfs (5).

Published information indicates the region receives approximately 40 to 42 inches of precipitation annually, of which less than 20 inches, on average, is lost to evaporation and evapotranspiration (5,9). The remainder is transported to surface water bodies as surface runoff, or infiltrates the ground and flows as ground water, eventually discharging to the streams and rivers as baseflow. The percentage of streamflow that is comprised of ground water baseflow varies seasonally, and is typically highest in the summer months, when rainfall and snowmelt are minimal, and evapotranspiration rate is high.

AQUIFER AREAS AND WATER SUPPLY WELLS

Ground water supplies in the region have primarily been developed from glacial outwash deposits. The amount of water available from surficial deposits generally depends upon the grain size, degree of sorting (a well sorted material has a very consistent grain size; a poorly sorted material has a wide range of grain sizes, from clay-sized particles to boulders), and saturated thickness. The glacial outwash deposits in the vicinity of Devens are well suited for aquifer development because they are generally coarse-grained, well sorted, and frequently in low-lying areas where ground water discharges to surface water bodies such as rivers, lakes, and wetlands. Saturated thickness is therefore



Fort Devens Boundary

North Nashua
(To Leominster)

Main Stem

Bowers Brook / Nonaicoicus

River

Town Boundary

Interstate Highway

Major Road

Railroad Line

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Figure 5
Drainage Divides

November, 1994

0 3500 7000 Feet

15 130 Acres

BASINS

generally greatest in these low-lying areas where the water table is shallow and typically similar in elevation to surface water bodies. Ground water recharge to these aquifers is estimated to range from approximately 13 to 20 in./yr. (5,9).

The areal extent of glacial outwash deposits and locations of municipal water supply wells in the region are shown in Figure 6. Previous reports have only illustrated aquifer areas that have been classified by the U.S. Geological Survey as medium-yield and high-yield (10,11). For this report, however, the entire aquifer area is of interest. The aquifer areas classified as low-yield may have limited saturated thickness, but they generally have hydraulic conductivity that is similar to the medium and high-yield areas, and they are typically contiguous with these higher yield aquifer areas. The low-yield is also attributable to their position in the watershed, which is typically along the upgradient fringes of the aquifer. The low-yield aquifers are, therefore, significant from a water supply planning perspective because they contribute ground water flow to the more transmissive downgradient aquifer areas.[1]

The direction of ground water flow through the aquifers generally follows topography and surface water drainage. Because the aquifer areas have higher hydraulic conductivity, and more moderate slopes than the surrounding glacial till and bedrock upland areas, ground water recharge and ground water baseflow contributions to surface water are typically greater in the aquifer areas. Therefore, watersheds that contain substantial area overlain by aquifer materials will have proportionately greater potential baseflow than watersheds that are predominantly comprised of glacial till and bedrock.

In general, bedrock in the region has a considerably lower transmissivity than the glacial outwash deposits. Most bedrock wells drilled in the region have provided yields of less than 30,000 gallons per day (gpd); however, the bedrock generally yields enough water for domestic use. Many areas in the Towns of Harvard, Shirley, and Lancaster utilize bedrock water supply wells.

The municipal water supply well for the Town of Harvard, in the vicinity of Bare Hill Pond, is drilled in bedrock and yields approximately 20,000 gpd. In contrast, the other municipal wells in the Main Stem and BB/N subwatersheds, including the four wells at Devens, are screened in glacial outwash deposits and have a potential cumulative yield of approximately 5 million gallons per day (mgd). This includes the Grove Pond Wells which are for emergency purposes only. Hydraulic data for municipal wells and well fields in the vicinity of Devens, including well depths, aquifer types, average and maximum withdrawal rates, and estimated aquifer transmissivity are summarized in Table 1.

1/ Transmissivity is defined as the product of aquifer saturated thickness and hydraulic conductivity, which is a measure of the ease with which water flows through saturated soil or rock.

Table 1 **SUMMARY OF MUNICIPAL WATER SUPPLY WELL DATA**

Well Field	Sub-Watershed	Aquifer Type	Average Withdrawal Rate (mgd)	Maximum Withdrawal Rate (mgd)	Transmissivity (ft^2/day)	Well Depths (ft)
Devens-MacPherson	Main Stem (39%); Bowers Bk./Non. (61%)	glacial deposits	0.34	1.4	4,000+	93
Devens-Grove Pond	Bowers Bk./Non.	glacial deposits	0.02	1.0	4,000+	35-43
Devens-Patton	Bowers Bk./Non.	glacial deposits	0.82	1.4	4,000+	67
Devens-Sheboken	Main Stem (40%); Bowers Bk./Non. (60%)	glacial deposits	0.37	1.4	4,000+	76
Ayer-Grove Pond	Bowers Bk./Non.	glacial deposits	1.89	2.02	21,000-51,600	60-60.5
Harvard-Pond Road	Bowers Bk./Non.	bedrock	0.02	0.04	NA	147
Harvard-DPW Well	Bowers Bk./Non.	glacial deposits	0.001	0.007	NA	<50
Harvard-Bolton Rd.	Bowers Bk./Non.	NA	NA	0.02	NA	NA
Shirley-MCI	Main stem	glacial deposits	0.24	0.39	28,650-57,300	40-60
Shirley-Patterson	Main stem	glacial deposits	0.3	0.72	NA	50

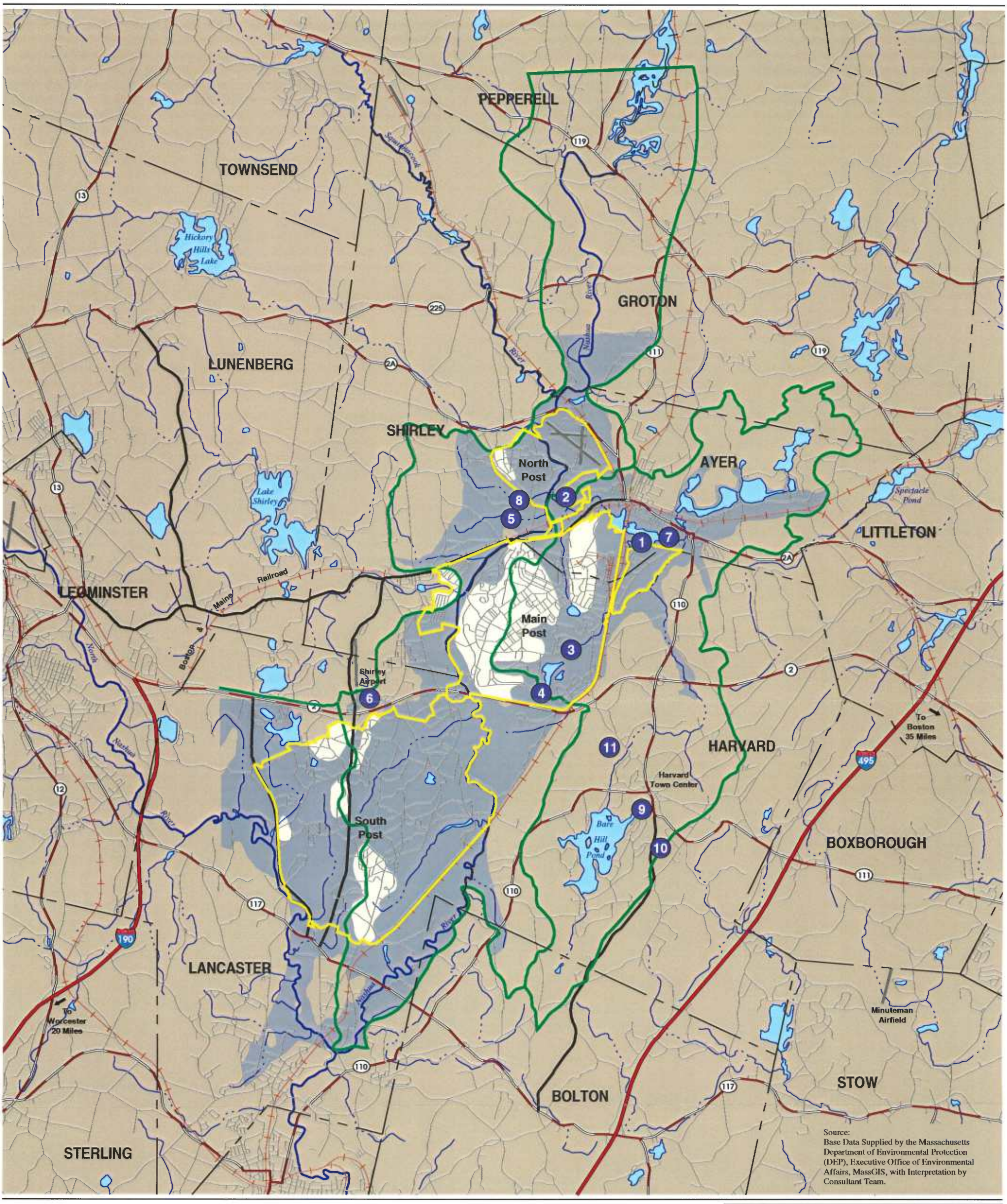
Notes:
1. Data derived from NRWA publications, ENSR report (March 1993), CDM report (January 1993), ETA report (September 1994), and inquiries with local officials.
2. The MacPherson and Sheboken wells are located on the boundary between two subwatersheds. Their location in the subwatersheds is based on the percentage of preliminary Zone IIs, as defined by ETA in the 9/16/94 Report, which fall into each subwatershed.
3. NA: Data not available or not assessed.

WATER SUPPLY WELLS

The following section describes the water supply wells within the Towns of Ayer, Harvard, and Shirley which are outside the limits of Devens. Devens' water supplies are described separately. These are presented to provide a general understanding of the regional water supplies and consumption trends which have the potential to impact the available ground water resources within and surrounding Devens.

Town of Ayer

The Town of Ayer, through its Water and Public Works Departments, currently operates and maintains an extensive water supply system that serves approximately 95 percent of the community. The water supply and distribution system consists of: two active wells and a treatment plant at the Spectacle Pond aquifer outside the Nashua River watershed on the east end of the town; two inactive wells and a treatment plant, for emergency use only, adjacent to Grove Pond in proximity to Devens (see Figure 3); two water storage tanks with a capacity of 844,000 gallons; and approximately 33 miles of transmission and



- Fort Devens Boundary
- Outwash Area
- Limit of Sub-Watersheds

1. Grove Pond Well Field
2. McPherson Well
3. Patton Well
4. Sheboken Well
6. Massachusetts Correctional Institute Wells
5. Shirley Village - Patterson Well
7. Ayer - Grove Pond Wells (Two Wells) (Emergency Backup)
8. Shirley Village - Walker Road Well (Proposed)
9. Harvard - Pond Road Well
10. Harvard - Bolton Road Well (Emergency Backup)
11. Harvard - DPW Well

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Figure 6
Surficial Geology

November, 1994

0 3500 7000 Feet

15 130 Acres

REGAQ

distribution piping. The system has approximately 1,860 connections serving over 6,500 in the community. In addition, over 275 hydrants throughout the town are connected to the system. For emergency needs, in addition to the Grove Pond wells, Ayer has water supply connections to Devens and the Town of Littleton. Neither of these connections has been used in the past fifteen years.

The wells at Spectacle Pond have been pumping at or near their approved combined maximum daily rate of 2.5 million gallons per day (mgd) since 1990. A history of Ayer's water use, from the Spectacle Pond wells, since 1980 is provided in Table 2. The two wells at Grove Pond have a combined pumping capacity of approximately 1.9 mgd, however this water is restricted to emergency use. Based on 1992 data, approximately 34 percent of the town's water use is for residential use, 23 percent for commercial use, 28 percent for industrial use and 9 percent for municipal use.

Table 2 **TOWN OF AYER - HISTORICAL WATER USE**

Year	Average Daily Demand (mgd)*	Maximum Daily Demand (mgd)
1980	1.38	1.40
1981	1.19	1.30
1982	1.30	1.67
1983	1.36	2.64
1984	1.48	1.68
1985	1.43	1.57
1986	1.47	1.96
1987	No data	No data
1988	1.79	No data
1989	1.60	1.82
1990	1.67	2.66
1991	1.59	1.88
1992	1.79	2.31

Note: * million gallons per day
Source: Massachusetts Department of Environmental Management, Division of Resource Conservation (DEM-DRC)

Limitations to Ayer's water supply system, include pumping capacity restrictions on the wells at Spectacle Pond, inadequate amount of available water storage for fire fighting purposes, and need to replace aged and corrosion susceptible pipes. The Ayer Grove Pond well is high in iron and manganese which is why it is presently used only as an emergency backup supply (12). The treatment facility at the Grove Pond wells is currently incapable of removing the higher than acceptable levels of iron and manganese present in the water from these wells. Additionally, to serve the remaining 5 percent of the town's population and to provide full coverage for fire fighting, extension of the existing transmission and distribution piping is necessary.

As noted above, Ayer's Spectacle Pond wells are operating at or near their permitted maximum pumping capacity. This leaves little room for increased service needs as the town's population grows or as expanded service is desired in areas of the town already served. Ayer's projected population growth and service increase is shown in Table 3. The Spectacle Pond aquifer, which is

separate from the Devens aquifer, is shared with the Town of Littleton. Littleton's wells can operate at an estimated 1.5 mgd capacity (13).

Table 3 **TOWN OF AYER - PROJECTED SERVICE**

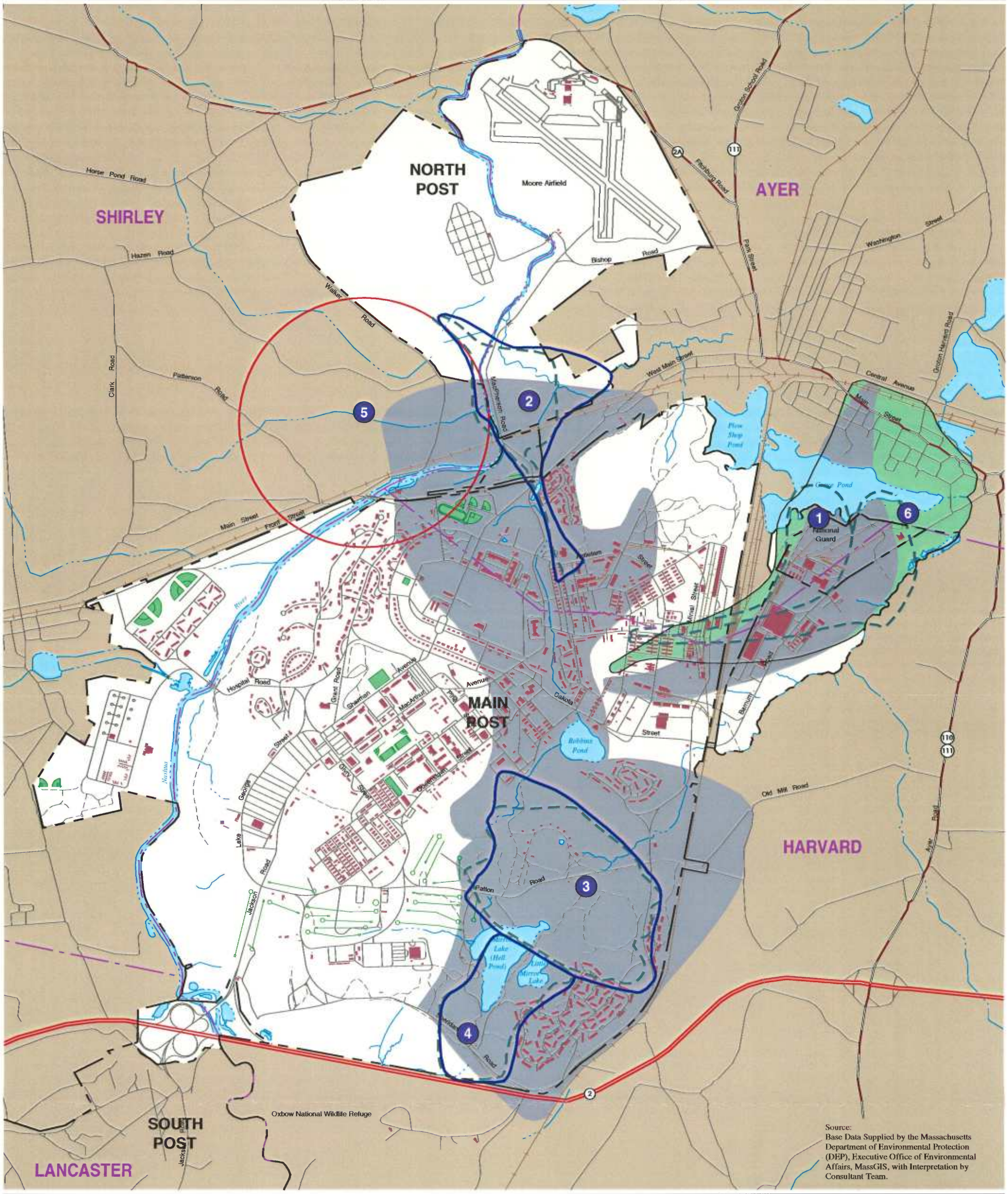
Year	Projected Population*	Percent Served	Service Population
1990	6,871	95	6,527
1995	7,057	97	6,845
2000	7,243	100	7,243
2010	7,377	100	7,377
2020	7,498	100	7,498

Note: * Population projections provided by the Metropolitan Area Planning Council.
Source: DEM-DRC

Expansion of the water supply system, including identifying additional sources, for the Town of Ayer is being investigated. The town has hired the consulting firm of Camp Dresser & Mckee, Inc. (CDM) to conduct a study on reactivating the Grove Pond wells (12). The purpose of this study is to address the treatment methods needed to remove the iron and manganese in the wells and to meet other federal and state water quality standards. Also being investigated is the possibility of adding a third well at Grove Pond that could provide an additional 1 mgd capacity to the current Grove Pond capacity of nearly 2 mgd. In addition to reactivating the Grove Pond wells, Ayer is proposing increasing the pump size on one of the Spectacle Pond wells from 700 to 1000 gallons per minute (gpm) and adding a third well at this site.

The town owns the land within Zone I for all of its public wells. Zone II for the Grove Pond wells has been delineated as shown in Figure 7. Potential contamination sources for the Grove Pond wells include four sites currently within the military reservation: the National Guard motor pool, Shepley's Hill and Cold Spring Brook landfills, and the motor pool at Devens. Other potential contamination sources include the former Hartnett Tannery and the B&M Railroad tracks and yard. Ground water modeling studies performed by the U.S. Army concluded that the Shepley's Hill landfill should not affect Ayer's wells at Grove Pond.

Ayer does not have a wellhead protection plan or any other protective measure beyond controlling the land under Zone I to safeguard the water supply aquifers it currently uses or plans to use in the future. To deal somewhat with the potential of hazardous materials spills, the Water Department informally works with the Fire Department on emergency response planning. Since 1991 Ayer has proposed the addition of a Water Supply Protection District section to their Zoning Bylaw, however passage of this measure has consistently been rejected by the town, at town meeting. The proposed measure contains language that provides for a cooperative effort in protecting the Spectacle Pond aquifer it shares with the Town of Littleton. The Town of Littleton has an aggressive aquifer protection strategy in place, and therefore similar measures undertaken by the Town of Ayer could provide a significantly enhanced protection level to this aquifer that is currently Ayer's primary water source.



Source:
Base Data Supplied by the Massachusetts Department of Environmental Protection (DEP), Executive Office of Environmental Affairs, MassGIS, with Interpretation by Consultant Team.

ENSR & ETA Combined Preliminary Zone II

Town of Ayer Delineated Zone II

Interim Zone II

Zone II Safe Yield Pumpage, ETA 1994

Zone II Permitted Pumpage, ETA 1994

Well Locations

1. Grove Pond Well Field
2. McPherson Well
3. Patton Well
4. Sheboken Well
5. Shirley Village - Patterson Well
6. Ayer - Grove Pond Wells (Two Wells) (Emergency Backup)

EDAW / VHB

LAND BANK

Devens Base Reuse Center
Ayer • Harvard • Lancaster • Shirley

Figure 7
Zone II Delineations

November, 1994

0 1000 2000 Feet

1 10 Acres

3598ZONE

Town of Harvard

The Town of Harvard maintains the smallest of the four water distribution systems presented in this report. The public system for potable water and fire fighting is limited to the core business and municipal center of the town. Harvard's Department of Public Works provides 71 water connections that serve approximately 200 people year-round. This increases to nearly 1,000 during the portion of the year when the system's largest single user, the public school system, is in session. The last major improvement to the system occurred over 10 years ago.

Harvard's public water system consists of one active well, a 340,000 gallon storage tank and a very limited distribution system of water mains. The active well, Pond Road Well, has an estimated maximum pumping rate of 0.043 mgd and can maintain a constant supply rate of about 0.029 mgd if required. In recent years, their average daily demand has typically been 0.015 mgd and can be traced in most part to the public school system. Approximately 37 households are tied into the municipal water system. Remaining households (up to 3000) receive potable water from private, residential wells. A second municipal well, which is reserved for emergency use only, is located off of Bottom Road. The well, which has never been used, can pump water at a maximum rate of 0.028 mgd. Ground water in the well reportedly has high levels of iron.

Harvard has a small third well that only serves two connections, the Department of Public Works building and one private residence. The well is located off Depot Road and pumps less then 1,200 gpd.

The town has very limited resources to maintain or expand their system. The Department of Public Works provides only the most basic maintenance and repair service. In the event that large scale repairs are needed, Harvard typically summons the Town of Littleton for assistance. Physical limitations such as shallow depths to bedrock combined with extensive relief throughout the town make expansion of the system expensive. The Harvard Water Commission has tried unsuccessfully for several years to pass a budget request through the town council to install a new well and pump station. Due to these and other circumstances, the town has suspended the installation of any new public water connections except for those for emergency purposes.

Harvard has not designated any Zone II for its wells and provides no protective measures to assure the quality of any high yield aquifer within the town. It has no agreements with the Town of Ayer to protect the Zone II around Ayer's Grove Pond wells, which falls within Harvard's town limits. Septic systems and road salts are probably are the most likely contamination sources for the Harvard wells and the portion of the Ayer Grove Pond wells Zone II that falls within Harvard. Other potential or existing contamination sources have not been identified.

Town of Shirley

Water supply needs in the Town of Shirley are provided by the Shirley Water District, an autonomous body with nearly a ninety year history. It serves approximately one-half of the community; an estimated service population of nearly 3,100 people. The water supply system consists of two active wells, two

intermediate booster pump stations, one 250,000 gallon standpipe, one 647,000 gallon reservoir and nearly 27 miles of water distribution mains. In addition, there are approximately 200 district-owned or privately-owned fire hydrants connected to the water supply system. There is a single water main connection to Devens water supply distribution system for emergency purposes only. This emergency connection has not been used in some time, if at all.

The district's wells, Catacoonamug and Patterson Road, (see Figure 5) have had a combined daily average of 0.28 mgd in recent years. The average use per capita has typically been below 100 gallons/day. The average and maximum daily water use demand history is provided in Table 4. The Catacoonamug Well typically contributes 26 percent of the district's water supply and the Patterson Road Well contributes the remaining 74 percent. For 1992, the district reported water use distribution as approximately 76 percent for residential use, three percent for commercial use, two percent for industrial use, and one percent for municipal use. The remaining eighteen percent was unaccounted for by the district.

Table 4 **TOWN OF SHIRLEY - HISTORICAL WATER USE**

Year	Average Daily Demand (mgd)*	Maximum Daily Demand (mgd)
1980	0.23	0.64
1981	0.25	0.42
1982	0.24	0.32
1983	0.24	0.31
1984	0.23	0.33
1985	0.24	0.32
1986	0.27	0.38
1987	0.25	0.35
1988	0.24	0.52
1989	0.24	0.39
1990	0.27	0.55
1991	0.28	0.40
1992	0.28	0.49

Note: * million gallons per day
Source: DEM-DRC

The Shirley Water District performs a regular maintenance program which maintains its water supply system in good repair. The town is also planning to expand its water supply system to residents which have recently petitioned for public water due to private well troubles. The projected population and expected service increase are shown in Table 5.

Table 5 **TOWN OF SHIRLEY - PROJECTED SERVICE**

Year	Projected Population*	Percent Served	Service Population
1990	6,118	50	3,059
1995	6,423	50	3,219
2000	6,728	50	3,372
2010	7,032	50	3,524
2020	7,128	50	3,572

Note: * Population projections provided by the Metropolitan Area Planning Council.
Source: DEM-DRC

Shirley is also seeking other improvements in an effort to expand its current supply system. To meet future needs, Shirley may purchase additional property between Patterson and Walker Roads in order to develop a new well field adjacent to the existing well in this area. At a minimum, this purchase will aid in protecting the existing aquifer.

The Shirley Planning Board is seeking to amend the town's Water Supply Protection Overlay District bylaw (Section 4.13). The town's bylaw, in effect, restricts certain land uses within delineated zones around each of the water supply wells. The Patterson well, which is outside Devens, is on property owned by the Shirley Water District. The water district also owns several of the lots around this well. Shirley has established a protective radius of 800 feet (Zone I) around the Catacoonamug Well, and a radius of 1,000 feet around the Patterson Well and the proposed well sites. Shirley has identified future town well sites, including the Catacoonamug Well in Shirley Village. Shirley has not identified any specific sources of contamination affecting the wells. In addition to the Town of Shirley municipal water wells, the Massachusetts Correctional Institute (MCI) in Shirley maintains two potable water production wells. Only one of the wells is typically used; the second well is reserved as an emergency back-up well only. The average pumping rate of the MCI well is 0.24 mgd. Iron levels are reportedly high; however, the water is not treated prior to distribution.

Devens

Devens presently maintains and operates a water supply, treatment and distribution system separate from Shirley, Ayer, and Harvard. The water supply system includes four ground water well sources, 145 miles of distribution mains, two elevated steel storage tanks with a capacity of 1,000,000 gallons each, wellhead treatment equipment and fire hydrants. The fire hydrants are typically located along each main at a spacing of no more than 500 feet. The Sheboken, MacPherson, and Patton wells also have 30,000 gallon retention tanks at their respective locations. The sources for Devens water supply system, which include the Grove Pond, Sheboken, MacPherson, and Patton Wells are presented in Table 6.

Table 6 **DEVENS WATER SUPPLY SOURCES**

Well Name	Yield (mgd)	Location
Grove Pond	1.0	Ayer
Sheboken	1.4	Harvard
MacPherson	1.4	Ayer
Patton	1.4	Harvard

Source: ETA, 1994

The Massachusetts Department of Environmental Protection Division of Water Supply (DEP-DWS) has authorized Devens to withdraw approximately 1.3 mgd. This figure is based on historic withdrawal rates between 1981 and 1985. Historic consumption rates at Devens are included in Table 7.

Table 7 **DEVENS AVERAGE DAILY WATER CONSUMPTION RATES**

Year	Population Served Winter/Summer	Avg. Daily Use
1990	13,500/16,500	1.01 mgd
1989	13,500/16,000	1.18 mgd
1988	13,000/15,000	1.97 mgd

Source: Ebasco Infrastructure

Approximately 90 percent of the water from the four wells is used for residential purposes, while the remaining 10 percent is used for municipal purposes. Ninety percent of the distribution mains lie in Harvard, 6 percent in Ayer and 4 percent in Shirley.

Average withdrawal rates have been below DEP-DWS permitted yields and, according to Army records, water quality results in the four Devens wells have been in compliance with DEP-DWS drinking water standards with the exception of the MacPherson well, which has had elevated levels of sodium, and the Patton well, which has had elevated levels of manganese (14). Up to 44 mg/l of sodium has been detected in the MacPherson well, which exceeds the Office of Research and Standards guideline (ORSG) of 28 mg/l. Up to 0.42 mg/l of manganese has been detected in the Patton well, which exceeds the Secondary Maximum Contaminant Level (SMCL) of 0.05 mg/l. The water quality data are summarized in Table 8. Trace levels of volatile organic compounds have been detected; however, the levels were below the U.S. Environmental Protection Agency and DEP Maximum Contaminant Levels (MCLs).

Table 8 **GROUND WATER QUALITY DATA**

Date	Sodium (mg/l)	Potassium (mg/l)	Sulfate (mg/l)	Chloride (mg/l)	Nitrogen (NO3) (mg/l)	Iron (Fe) (mg/l)	Manganese (Mn) (mg/l)
Grove Pond Well							
2/18/81	11	2.8	13	21	1.1	0.03	0.04
1/27/82	--	1.0	22	24	1.3	0.03	--
1/18/84	14	2.2	6	22	1.5	0.09	0
4/22/86	15	2.1	18	21	1.2	0.14	<0.02
3/31/94	--	2.24	23	29	--	<0.02	<0.02
Patton Well							
2/18/81	11	2.8	1	22	0.3	0.1	0.33
1/27/82	--	1.8	13	21	0.3	0.11	0.01
1/28/83	12	2.7	13	28	0.3	0.09	0.31
1/18/84	16	2.4	14	33	0.3	0.11	0.2
2/04/85	10	2.3	17	24	0.2	0.03	0.26
4/22/86	16	2.5	23	30	0.3	0.12	0.19
4/21/87	13	2.3	12	26	0.2	<0.04	0.42
4/19/88	12	2.3	10	23	0.3	0.07	0.28
1/19/89	17	2	12	25	1.7	0.2	<0.03
3/31/94	--	2.48	19	29	--	0.2	0.36
Sheboken Well							
2/18/81	5.3	2.3	13	16	0.1	0.15	0.22
1/27/82	12	2.3	13	17	0.1	0.17	--
1/28/83	7.1	2.3	13	17	0.1	0.17	0.19
1/18/84	7.1	2.0	3	17	0.1	0.12	0.17
2/04/85	8.2	2.0	8	16	0.1	0.06	0.13
4/22/86	8.5	2.5	14	17	0.1	0	0.13
4/21/87	7.3	2.1	4	17	0.1	<0.04	0.11
3/31/94	--	1.94	<1.0	16	--	0.12	0.15
MacPherson Well							
2/18/81	3	2.6	61	61	0.3	0	0
1/27/82	6.5	1.9	48	59	0.5	0.13	--
1/28/83	30	2.3	45	69	0.5	0.03	0
1/18/84	42	2.1	24	67	0.5	0.02	0.01
2/04/85	38	2.0	40	67	0.4	0	0.02
4/22/86	41	2.3	46	75	0.6	<0.04	<0.02
4/21/87	24	2.1	35	49	0.5	0.06	0.03
4/19/88	40	2.4	38	66	0.6	0.04	<0.03
1/19/89	44	2.3	42	75	0.8	0.04	0.03
3/31/94	--	1.5	44	32.9	--	0.04	0.09
Standards-All Wells							
MMCLs	--	--	--	--	10	--	--
SMCLs	--	--	250	250	--	0.3	0.05
ORSGs	28	--	--	--	--	--	--

Notes: MMCLs = Massachusetts Maximum Contaminant Levels.
SMCLs = Secondary Maximum Contaminant Levels.
ORSGs = Office of Research and Standards Guidelines.
Source: Water quality data provided by the Army Environmental Center in a data package, 20 July 1994.

In the event the system requires an increase in permitted withdrawals or a change in ownership, the state approval process (the Water Management Act)

would require a revised application for greater withdrawal, an assessment of the impact of the increased withdrawal on the aquifer and ecological systems, delineation of well capture and influence zones, review of aquifer protection policies and clean-up efforts, and a general inspection of wells, treatment, and distribution system components. If additional wells are installed, new Zone II delineations would also be required for those wells. This information would be required as part of the application process to gain approval through the DEP-DWS upon a change of ownership or an increase in withdrawal rates regarding the existing wells at Devens.

DEVENS WELLS SAFE YIELD ANALYSIS

Constant rate pumping tests were conducted by ETA on three of the Devens wells: the MacPherson, Patton, and Sheboken wells. The purpose of the pumping test program was to develop aquifer parameters for ground water modeling in support of Zone II delineations, and to develop estimates of well safe yield in accordance with DEP-DWS Guidelines and Policies. Well safe yield is a function of the aquifer properties, the available drawdown in the well bore, and the well efficiency. The results from the pumping test reports (15,16,17) indicate the following:

- In the vicinity of the MacPherson well, the aquifer was classified as a confined/unconfined aquifer with a single recharge boundary (the Nashua River) within the radius of influence. The transmissivity and storativity of the aquifer were calculated to be 40,291 ft^2/day and 0.0012, respectively. The estimated safe yield of the well was 1.85 mgd.

- In the vicinity of the Patton well, the aquifer was classified as a leaky, semi-confined aquifer with drawdown in the confining layer, and which is bounded laterally by impermeable barrier boundaries (till and bedrock). The transmissivity and storativity of the aquifer were calculated to be 23,900 ft^2/day and 0.006, respectively. The estimated safe yield of the well was 1.54 mgd.

- In the vicinity of the Sheboken well, the aquifer was classified as a leaky, semi-confined aquifer with drawdown in the overlying layer. The transmissivity and storativity of the aquifer were calculated to be 24,600 ft^2/day and 0.00001, respectively. The estimated safe yield of the well was 1.79 mgd.

The safe yield of the Devens aquifer, which provides water to these wells, is described in a subsequent section of this chapter. The cumulative safe yield of the three wells does not exceed the estimated safe yield of the Devens aquifer.

ZONE II DELINEATIONS

General

Zone II areas are delineated to protect wells from potential sources of contamination within the area of land contributing water to the well under long-term pumping conditions. Zone II delineations were prepared and accepted by the DEP for the Town of Ayer Grove Pond wells and Shirley MCI wells (12,18). Conceptual Zone II delineations were prepared for the Devens wells by ENSR

Consulting and Engineering for the Fort Devens Environmental Management Office, and have recently been revised by Engineering Technologies Associates (ETA), on behalf of the Army Environmental Center (9,19). Zone II delineations were not available for the Town of Shirley wells, and have not been developed for the Harvard wells. Approved, conceptual, and proposed Zone II delineations are shown in Figure 7 along with Interim Wellhead Protection Areas (IWPAs), labeled in the figure as "Interim Zone IIs" which are based on a fixed radius of 1/2 mile around the wellhead. IWPAs are not based on hydrogeologic analysis.

Devens Wells

It is important to note that Zone II delineations are significant to the protection of contributory areas to a specific well site. For the purposes of the Reuse Plan, however, protection of the entire watershed and aquifer, which may contribute to water supply in the future, will be important. The delineation of Zone IIs will aid in the process of drawing aquifer protection zones which will be included in the full extent of glacial outwash deposits which represent future water resources. Different levels of protection may be appropriate for different areas of the aquifer.

The Conceptual Zone II delineations prepared by ENSR were defined based on incorporation of published information and historical pumping data in a two-dimensional, steady-state ground water flow model. The model was used to predict the "capture zone" over which the wells draw their water under severe pumping conditions that could be encountered in a drought (180 days of pumping with no recharge). Hydrologic parameters were not developed by field testing.

The Zone II delineations were revised by ETA (19) which calibrated a three-dimensional, finite difference ground water flow model for the project. The model simulated ground water flow in the glacial drift water table aquifer and the underlying bedrock aquifer. Data from previous site and remedial investigations and recent field investigations were incorporated into the model (9,15,16,17,20). Hydrologic data were obtained from field investigations which included pumping tests, streamflow monitoring, precipitation monitoring and ground water level monitoring.

Pumping tests were conducted at the Sheboken, MacPherson, and Patton water supply wells, and at a bedrock monitoring well at Shepley's Hill Landfill. Piezometers were drilled at these sites to observe ground water levels during the pumping tests. To develop estimates of baseflow in streams, stream stages (stream elevation) and precipitation were monitored during the fall of 1993 and the spring of 1994 at stations along Willow Brook and Cold Spring Brook. Continuous monitoring of water levels was conducted at Willow Brook and Cold Spring Brook gauging stations, two stream-side piezometers, and one monitoring well during this same time period.

Ground water flow was simulated using MODFLOW, a three-dimensional, finite difference computer model. The computer model is capable of simulating a heterogeneous aquifer with evapotranspiration, variable well pumpage, drains, streams, ponds, wetlands, variable recharge, and different boundary conditions under either water table or artesian conditions. Flow in the glacial drift and bedrock aquifers was simulated using a three layer model, with the bottom layer identified as the bedrock aquifer and the upper two layers identified as the

Table 10 **SUMMARY OF STREAMFLOW DATA, NASHUA RIVER**

Time (Percent Chance of Occurrence)	N. Nashua (Flow-cfs)	South Branch (Flow-cfs)	Main Stem (Flow-cfs)	Bowers Bk./Non (Flow-cfs)	Total Flow (cfs)	Total Flow (mgd)	Total Flow Safe Yields (mgd)
1	1,100	2.6	115.5	192.9	1,411	912	903
2	820	2.6	109	150.5	1,082	699	690
5	550	2.6	87.2	106	746	482	473
10	400	2.6	67.6	82.7	553	357	348
20	250	2.6	50.1	59.4	362	234	225
30	195	2.6	43.6	42.4	284	183	174
40	150	2.6	34.9	33.9	221	143	134
50	110	2.6	28.3	27.6	169	109	100
60	91	2.6	26.2	19.1	139	90	80
70	72	2.6	24	13.4	112	72	63
80	60	2.6	20	10.6	93	60	51
90	48	2.6	15.3	6.6	73	47	37
95	41	2.6	13.1	4.5	61	40	30
99	35	2.6	9.4	2.8	50	32	23

Notes:
1. Safe yield = 9.4 mgd = existing withdrawals plus the estimated safe yield withdrawal rates from the MacPherson, Patton, Sheboken, Grove Pond and Ayer-Grove Pond wells.
2. Flow from the South Branch of the Nashua River is regulated and set at approximately 2.6 cfs.
3. North Nashua streamflow data from U.S. Geological Survey Hydrologic Atlas HA276.
4. Main Stem and Bowers Brook/Nonacoicus streamflow estimated from drainage basin area and the percentage of area underlain by stratified drift (glaciofluvial deposits).
5. The Main Stem drainage basin represents the portion of the watershed upstream of the northern border of Devens.

Figure 8 indicates the projected hydrograph for the Nashua River. Under most flow conditions, except for extreme low flow conditions such as 99 percent time of occurrence, the safe yield withdrawal rate comprises a small percentage of the total potential streamflow in the Nashua River. However, based on estimates of aquifer area in the two subwatersheds (summarized in Table 11), the Main Stem subwatershed provides more baseflow to the Nashua River, and can therefore sustain a higher rate of ground water withdrawal without adverse impacts to streamflow in tributaries to the Nashua River. This should be considered if additional water supply wells are developed in the future.

ENVIRONMENTAL CONSTRAINTS

For purposes of facilitating implementation of base cleanup, Devens has been subdivided into five "zones", including the Industrial zone, the North Post zone, the Willow Brook zone, the Nashua River zone, and the Mirror Lake zone. These zones are illustrated in Figure 2. Environmental constraints on redevelopment in each of these areas include the presence of high-yield and medium-yield aquifers (as defined by the U.S.G.S and DEP), Zone II areas for municipal wells, wetlands, floodplains, and areas of known and potential contamination. In general, soils underlying the aquifer areas are well-drained coarse to fine sand and gravel with high hydraulic conductivity. These soils typically are encountered within approximately five feet below ground surface (below fill materials or topsoil), and extend to depths of approximately 25 to over 100 feet. Because the aquifer areas are confined primarily to low-lying areas, often adjacent to surface water bodies, depth to ground water is generally shallow, ranging from zero feet in wetlands to approximately 50 feet in small hills comprised of well-drained outwash deposits.

Less permeable, poorly-drained fine-grained soils and organic deposits overlie the aquifer soils in narrow zones along the Nashua River and its tributaries, and in some wetlands. These less permeable soils are beneficial with respect to aquifer protection because they impede the infiltration of contaminants and attenuate contaminants by adsorption and biodegradation. A summary of the primary environmental constraints in each of the zones is provided below (10):

- Industrial Zone: 80 percent of this zone overlies the medium-yield and high-yield aquifer areas and portions of Zone IIs for three well systems (the Grove Pond well field, the Ayer Water Department - Grove Pond well field, and the Patton well) occupy 35 percent of this zone. Three conservation/recreation resource areas (Grove Pond, Plow Shop Pond, Cold Spring Brook) and wetland buffer zone (310 CMR 10 et. seq.) abut the zone to the north and east. Potential sources of contamination include eight known Areas of Contamination (AOCs) and four Study Areas (SAs) under investigation including a vehicle maintenance/storage area, a battery repair building, releases from underground storage tanks, and two landfills (Shepley's Hill and Cold Spring Brook). In addition, the B&M Railroad Right of Way, and related rail yards bisect this zone.

- North Post Zone: 90 percent of this zone is underlain by medium and high yield aquifer areas. In addition, 20 percent of the southwestern section of this zone is covered by Zone II of the MacPherson Well and the Interim Wellhead Protection Area (IWPA) of the Shirley Village Water District -

Patterson Well. The conservation/recreation resource segment of the Nashua River and associated wetland buffer zone (310 CMR 10 et. seq.) along the river also traverse this zone. One SA in the Moore Airfield and the Fort Devens Wastewater Treatment Plant (WWTP) with sludge drying beds are within this zone, west of the Nashua River.

- Willow Brook Zone: 55 percent of this zone is comprised of medium and high yield aquifer areas and a portion of the Zone II for the MacPherson well occupies approximately 15 percent of this zone. Two petroleum release sites (SAs) are near the southwest boundary of this zone.

- Nashua River Zone: 15 percent of this zone is comprised of medium and high yield aquifer area, and approximately 5 percent is comprised of the IWPA of the Shirley Patterson well. The conservation/recreation resource segment of the Nashua River, and associated wetlands and buffer zones along its banks transect this area. SAs within the zone include three landfills, and three petroleum sites.

- Mirror Lake Zone: 35 percent of this zone is underlain by medium and high yield aquifer areas and 45 percent is comprised of Zone IIs for two wells (Patton and Sheboken). There are eight potential contamination sources (SAs) in this zone, including the Mirror Lake landfill.

In general, the Industrial zone of Devens appears to contain the greatest sensitivity relative to potential sources of contamination to aquifers. A number of AOCs have been identified within this zone. Utilization of this area for industrial purposes is likely to continue, due to the historic use of this area and the presence of the Railroad Right-of-Way and railyard.

REGIONAL LAND USE IN AQUIFER AREAS

Regionally, aquifer areas outside of Devens in the BB/N watershed generally fall within forested or wetland areas (24). Most of the BB/N subwatershed outside of Devens is comprised of glacial till and shallow rock which are undeveloped. Industrial and commercial properties are located along Rte. 110/11 in Harvard, which overlies a thin width of the aquifer along Bowers Brook.

The majority of the Main Stem subwatershed upgradient of Devens is underlain by aquifer areas. Most of the area along the Nashua River is comprised of wetlands or forested buffer zones, including two conservation areas - the Oxbow National Wildlife Refuge and the Bolton Flats State Wildlife Management area. The South Post is largely open land. The Reuse Plan does not include this area, which has been used for military exercises, and which reportedly will remain as a military enclave (10).

The South Branch of the B&M Railroad runs through the southern portion of the watershed. Presently, land along the rail is largely undeveloped. Most industrial development is concentrated along the East-West branch, which follows the northern boundary of the Main Post.

SUMMARY OF POTENTIAL AQUIFER VULNERABILITY

Based on regional land uses, aquifer areas, and directions of ground water flow and surface water drainage, the aquifer areas that have the potential to be the most vulnerable to contamination are within the North Post area and the southern portion of the Main Post, both of which are in the Main Stem subwatershed; and the northeast portion of the Main Post, which is in the BB/N subwatershed.

The aquifer in the North Post area is overlain by potential contamination sources including the Devens Airport and the waste water treatment facility infiltration beds. The northeast portion of the Main Post has a concentration of industrial use along the B&M railroad right-of-way and rail yard, and several AOCs and SAs over the aquifer that supplies water to the Grove Pond wells.

The southern portion of the Main Post is upgradient of most potential contamination sources at Devens, but is bisected by Route 2, which is less than 1000 ft. from the Sheboken well. While outside the study area, there is a potential that accidents resulting in a release of petroleum along Route 2 could have an impact on the aquifer that supplies water to the Sheboken and Patton wells.

WATER QUALITY MONITORING PROGRAM

The Army has installed numerous monitoring wells in the vicinity of SAs and AOCs as part of site investigations, feasibility studies, and remedial investigation programs. In addition, observation wells have been installed proximate to existing water supply wells to support the Zone II delineation refinements. These observation and monitoring wells are, therefore, located in areas of critical importance from the standpoint of water supply protection, and should be incorporated in future monitoring programs geared toward performance-based water resource protection. At present, the Army conducts a quarterly monitoring program to document ground water and surface water levels.

The existing water quality database developed from these studies, and maintained by the Army, has been evaluated to develop current water resource protection strategies, and can be used to evaluate effectiveness of proposed protection strategies. Land use controls for protection of water supplies, must consider regional contaminant loadings in a watershed in order to predict how much development of a given land use can be allowed while maintaining drinking water standards in the resource. This can be achieved through mass balance analysis that considers typical contaminant loadings from the specific land uses, ground water flowrate through the watershed, and background water quality, which is influenced by existing land use.

The Fort Devens Base Realignment and Closure (BRAC) Cleanup Plan (BCP) has been completed for the Army Environmental Center by The Earth Technology Corporation. One important element of the BCP is the cleanup standards for SAs and AOCs which are developed through evaluation of Applicable or Relevant and Appropriate Requirements (ARARs) or risk assessment-based standards. This work is being conducted in accordance with the National Environmental Policy Act (NEPA); the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as

amended by the Community Environmental Response Facilitation Act (CERFA); the Resource Conservation and Recovery Act (RCRA); and other pertinent state and local regulations. Background levels have also been proposed by the Army based on compilation of chemical data from SAs and AOCs on-site. The cleanup standards and background levels will be considered in aquifer protection relative to estimating allowable increases in contaminant concentrations over existing, background conditions.

Any water resource protection plan will include protection and on-going sampling of existing ground water wells for the purposes of measuring ground water quality changes over time. This will allow the evaluation of the effectiveness of the program and will allow future fine tuning of regulations to achieve the desired effects.

WETLANDS MONITORING PROGRAM

Proposed wetland monitoring should be conducted to determine effects on wetlands from increased ground water withdrawal rates. Sampling stations should be established at those locations that may be affected by changes in ground water hydrology. These areas are defined as any wetland community where the average change in ground water elevation is predicted to be greater than 1.5 feet, as changes less than this are within the normal range of year-to-year variation and have a low probability of affecting vegetation.

Wetlands monitoring should include measurement of species composition, abundance, and cover along sampling transects. Three replicate plots along each transect should be sampled annually, and statistical analysis of data should be performed to detect changes in vegetation.

Sampling Station Locations

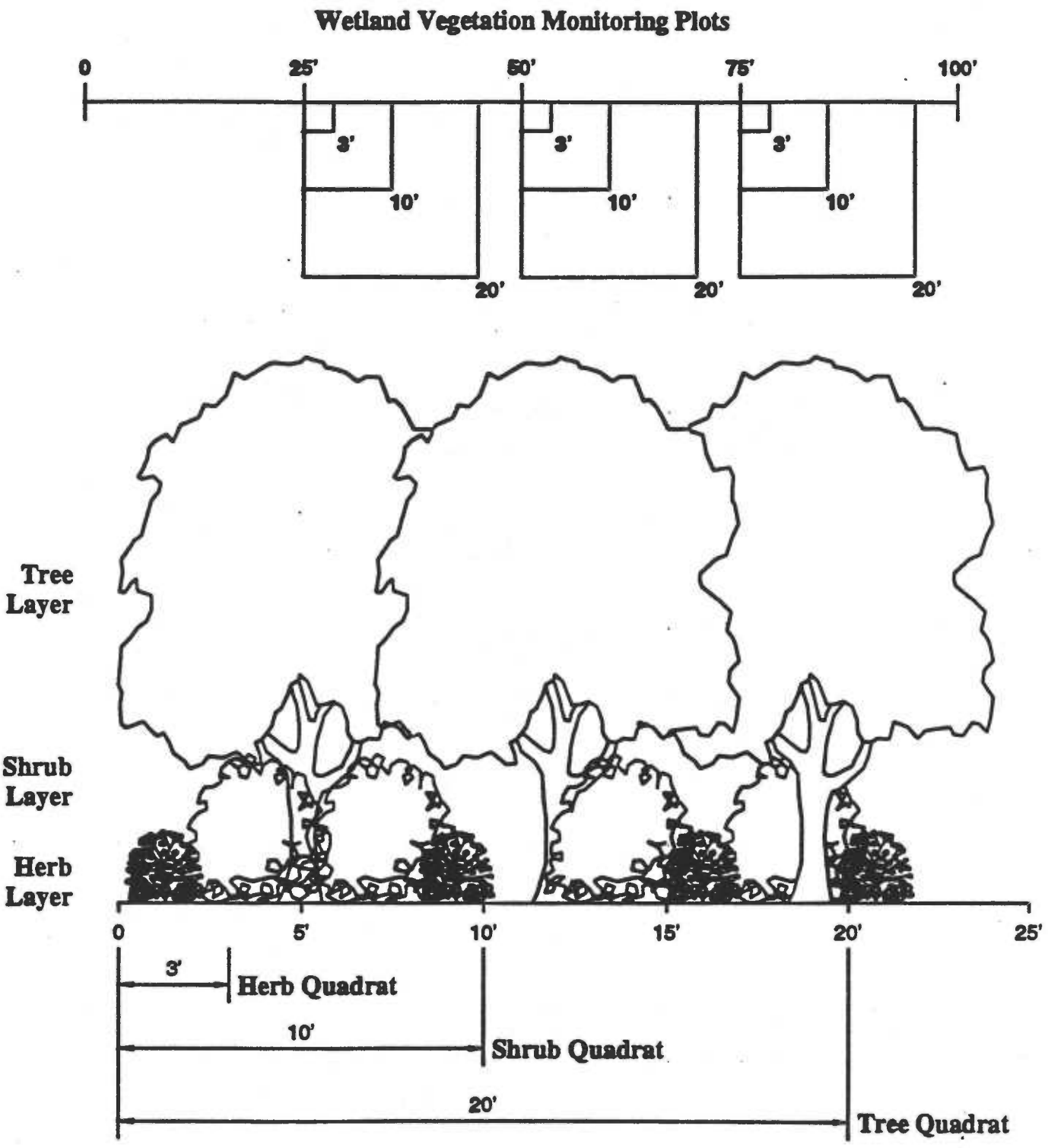
Vegetation should be sampled in square nested quadrats and by layers (Figure 9).

- The herbaceous layer is defined as all plants less than 3 feet tall, and includes seedlings of tree and shrub species as well as herbaceous species. Quadrat size is three feet on each side.

- The shrub layer is defined as all plants more than 3 feet, and less than 15 ft tall, and includes seedling or sapling tree species as well as shrubs. Quadrat size is ten feet on each side.

- The tree layer is defined as all plants more than 15 ft tall, and includes very tall shrubs as well as trees. Quadrat size is twenty feet on each side.

A 100-foot long baseline should be established at each sampling location. Nested sample plots should be located at 25 feet, 50 feet, and 75 feet along this baseline, as shown in Figure 9. This will provide three replicates for each sampling station, which will enable sampling dates to be compared statistically and should reduce the effects of random variation within plots.



Not to Scale

Vanasse Hangen Brustlin, Inc.

Vegetation Monitoring
Nested Sampling Plots

Figure 9

Frequency of Sampling

Sampling should occur once per year, at the time when species diversity and abundance is at a maximum. In New England, the optimal time for vegetation sampling is during July and August, preferably during the 30-day interval following July 15th.

Analysis

The most applicable measurement for terrestrial vegetation is the "Importance Value", a composite measurement of the frequency, density, and abundance of a species. This statistic is most informative and least subject to random fluctuation or distortion due to inherent differences in plant sizes. It is proposed that the Importance Value for each species in each sampling station be determined, as well as the overall density, percent cover, and diversity within each sampling station. These results can be compared among years, and will identify any measurable changes in vegetation.

Within each plot, data recorded for each species should include the number of stems and percent cover. From these data, relative frequency, relative density, and relative dominance can be calculated. The Importance Value is the sum of the following three measures of vegetation:

- Relative frequency = the number of plots a species occurs in, divided by the total number of plots in that sample station.
- Relative density = the number of stems of that species divided by the total number of stems in that sample station.
- Relative abundance = the percent cover of that species divided by the total percent cover within that sample station.

For analysis of data, the importance values of individual species, total density, total diversity, and total abundance can be directly compared between sampling dates, as can species composition of the vegetation. In addition, analysis of each sampling station by similarity analysis can detect more subtle changes in the plant community as a whole.

Results of the vegetation monitoring analysis should be used to assess vegetation changes. Potential changes, based on available models, include an increase in the cover of woody species; an increase in the abundance of upland herbaceous plants; and a decrease in the abundance of obligate wetland herbaceous species. Caution should be used in drawing conclusions as these are only indicators that the wetland is becoming drier.

Thresholds should be established for the determination of adverse impacts. These thresholds should be based on professional judgment, as there is no standard literature that provides comparable studies to serve as models. For example:

- A change in Importance Value of more than 25% for at least 25% of the species within the wetland community could be considered an indicator of a change in the plant community structure;

- The addition, or loss, of any species with more than 10% of the total density, dominance, or abundance could be considered an indicator of a change in the plant community composition.

LEGISLATIVE FRAMEWORK

The Massachusetts legislature enacted the Devens Enterprise Commission legislation in January 1994. The legislation established Devens as a regional enterprise zone and created the Devens Enterprise Commission with regulatory authority over matters of land use. Furthermore, the legislature empowered the Massachusetts Government Land Bank as the development agent and the provider of public services. The legislature also established $200 million of bonding authority for use by the Land Bank in the implementation of the Reuse Plan. This funding is available upon approval of the Reuse Plan and bylaws by Ayer, Harvard, and Shirley, as well as the Land Bank Board and the Commissioner of the State Division of Capital Planning and Operations. An important element of the Reuse Plan and bylaws will be the delineation of aquifer protection zones and related protection measures.

Under the Devens Enterprise Zone Legislation the Massachusetts Government Land Bank undertook the first phase of a Water Resources Protection Plan (WRPP) to determine the extent of the existing ground water resources at Devens, to identify potential contamination sources, and to develop preliminary recommendations for the management and protection of the ground water resources. The Phase II work for the project assessed how future water demands could be met. A final WRPP and Water Resource Protection Bylaws were developed. Regulations will ultimately be developed from the Bylaws.

WATER RESOURCES PROTECTION PLAN

This final section of the Water Resource Protection Report is the result of cumulative efforts by the communities in the region of Devens, the Water Resources Task Force, the Devens Reuse Center Staff, and the consultant team. This group has invested much time and effort into establishing the goals of the Water Resource Protection Plan, researching water resource protection plans from other communities, structuring a unique approach to water resource protection, and ensuring that the water resources at Devens will be protected in the future.

A unique approach was taken to water resource protection at Devens. Whereas many communities employ a performance-based standard approach to water resource protection, the water resources planning team decided to develop a resource protection hierarchy, based on activities in and overlying the defined resource areas, rather than performance standards, which typically allow pollution and contamination up to "acceptable" thresholds. The approach used combines land use controls, resource management area guidelines, and best management practices to promote the protection of all ground water and surface water resources.

The resource areas established have been refined since the distribution of the Phase I report, which was based on Interim Zone II wellhead protection districts. Although the definitive Zone II delineations have not yet been approved by the Department of Environmental Protection (DEP), better resource protection and planning decisions can be made, in order to guide the reuse planning process.

WATER RESOURCES PROTECTION PLAN GOALS

The goal of the Water Resources Protection Plan (WRPP) is to provide an appropriate level of protection for all water resources (surface and ground water) within the Devens Enterprise Zone while allowing economic development in an environmentally responsible manner. Consistent with that goal, the protection plan should provide protection of water resources and present straightforward requirements which are easily understood and implementable by the development community and enforceable by the the Devens Enterprise Commission. The intent of this plan is to preserve the high quality of surface and ground water in the aquifer underlying the Devens area in order to protect its future use, and to promote statewide goals for surface water quality in the Nashua River Basin.

To assist in the long term preservation of both surface and ground water resources, conservation and recycling measures should be encouraged for all users of the site. The effect of the implementation of these measures will not only be the protection of the water resources, but will also include protection of the associated wildlife, fisheries and wetland habitat.

The WRPP serves as a planning level document that has been used to develop the Devens Enterprise Zone Bylaws. Certain federal and state regulations have been paraphrased in the WRPP to promote public understanding of those regulations. However, to avoid misinterpretation of the federal and state regulations which apply to activities at Devens, the paraphrased regulations in the WRPP have been replaced in the bylaw with language indicating that all federal and state regulations apply. Whether explicit or implicit, all requirements and restrictions which are contained in the WRPP, are included in the Devens Regional Enterprise Zone Bylaws, Section XI Water Resources Protection Requirements.

Wetland protection issues have arisen during the water resources protection planning process. Although wetland issues are being addressed separately from water resource issues in the Devens Regional Enterprise Zone reuse planning process and in the Land Use By-Laws, it is important to note that there are certain sensitive wetland resources at Devens which merit protection above that guaranteed by the State of Massachusetts Wetlands Protection Act. In developing the overall Reuse Plan for Devens, great efforts were made to take into consideration the protection of sensitive natural environments. The result is a Reuse Plan that avoids, to a great extent, wetlands on the Main and North Posts.

WATER RESOURCE PLANNING AREA GUIDELINES

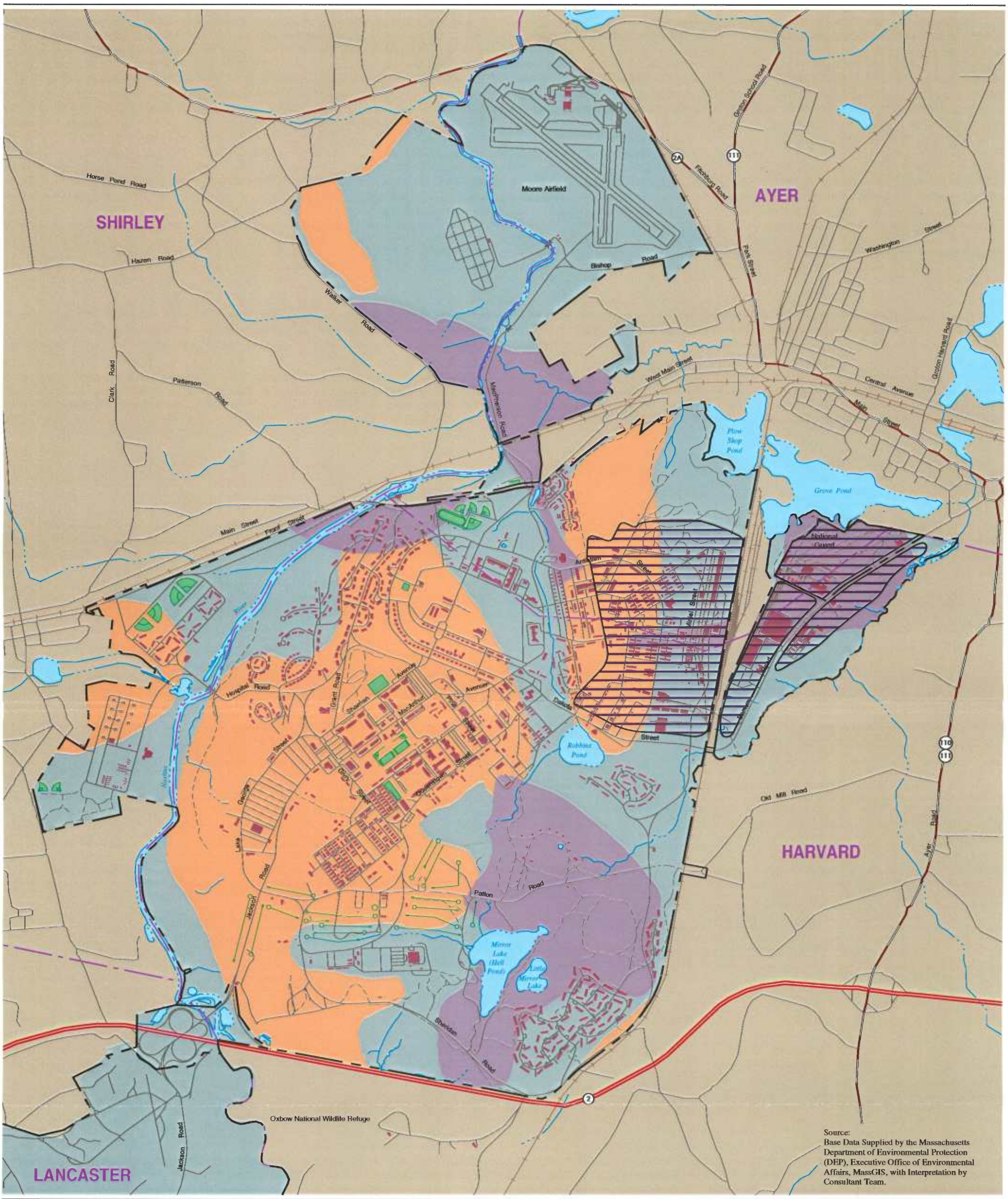
1. The Devens Enterprise Zone should be divided into four Water Resource Planning Areas over which differing levels of water resource protection would be applied (see Figure 10). These zones should be delineated as an overlay on the Reuse Plan. Interim delineations should be used for Zone II delineations in this plan where no more definitive information is available. When definitive Zone II delineation is available and accepted by the appropriate regulatory agencies it should be automatically adopted for this plan.

    - Zone I--area within 400 feet of a well. Activities limited to those relating to the water system operation only.

    - Zone II--areas which contribute ground water to existing wells. Best information on Zone IIs would be used as an interim delineation. When definitive Zone IIs are available they would be automatically adopted.

    - Aquifer Zone--areas over the aquifer which are not included in Zone I or Zone II.

    - Watershed Areas--all remaining areas of the Devens Enterprise Zone outside the Aquifer Zone, Zone I, and Zone II.



Zone II, ETA 1994

Aquifers

Watersheds

Rail Industrial

Ayer and Grove Pond Zone II's based on permitted yield because safe yield data are not available.

EDAW / VHB

LAND BANK

Devens Base Reuse Center

Ayer • Harvard • Lancaster • Shirley

Figure 10
Water Resources Protection Zones

November, 1994

0 1000 2000 Feet

1 10 Acres

3598PRT2

2. The protective measures over each of these zones should be described in a separate section of the bylaws.

3. Varying levels of protection should be provided for each zone based on its level of sensitivity with the highest levels of control established for Zone I and Zone II. Lesser levels of control, with specific standards, should be established for the Aquifer Zone and Watershed Areas.

4. The Rail -Related Use area overlies the aquifer, is adjacent to surface waters of Plow Shop and Grove Ponds, and therefore requires additional protective measures. A specific plan should be provided for the Rail/Industrial area including an area-wide stormwater management system designed to improve water quality.

5. Water resource protection should be evaluated for each development proposal through the approval process established in the bylaws. All development proposals, except minor proposals requiring only Land Use Administrator approval, must be reviewed for consistency with the Water Resources Protection Plan (WRPP) as part of the Development Permit process. Approval of activities as part of the Development Permit will run with the use.

Rail-Related Use Area

For this particular location within the Devens Enterprise Zone, specific controls and design measures have been proposed to assure compatibility with and protection of existing water resources. These controls and design measures will allow the generation, transportation, storage, and treatment of hazardous waste, associated with the ongoing operations of rail/industrial and trade-related businesses, while providing necessary protection to existing water resources. Acknowledging the sensitivity of the site, efforts will be made to mitigate existing conditions which threaten the ground water, and to establish best management practices using the best available technology to prevent future contamination. All provisions which apply to the Water Resources Protection Plan zones apply to the Rail-Related Use Area, with the exception that the provisions allow generators of hazardous waste beyond the level of Very Small Quantity Generators (VSQGs).

- Establish a stormwater utility to manage and maintain the predesigned area-wide system for stormwater treatment and control where none now exists.

- Prohibit on-site disposal of hazardous wastes.

- Provide detention, treatment, and on-site recharge for pavement and roof runoff to hold peak runoff rates below current rates.

- Design the stormwater treatment system to preserve and improve current water quality conditions.

- Design the stormwater system to intercept and isolate potential spills and provide for timely clean-up.

- Provide on-site response capabilities to respond to releases.

- Phase in the area-wide stormwater system, in advance of sites as they are developed.

GENERAL DESIGN/PLANNING PROVISIONS

The following provisions are to be applied throughout the Devens Enterprise Zone.

Best Management Practices (BMPs)

All Zones

BMPs should be required for both the construction and operation of facilities within the Devens Enterprise Zone. It is likely that additional BMPs will come about as redevelopment proposals are submitted. BMPs should include, but are not limited to, the following measures:

- The standard Devens Spill Prevention Control and Countermeasure Plan (DSPCC) will be required as part of each development proposal for all users. A prototype DSPCC will be prepared and provided to users to facilitate implementation by users.

- For all pesticide applications on land area greater than 1 acre, an approved Integrated Pest Management Program (IPMP) will be required. A prototype IPMP will be prepared and provided to users, to facilitate implementation.

- Groundwater monitoring should be utilized as needed to establish ambient water quality conditions.

- Public education programs for business and industries within the Devens Enterprise Zone to promote practices which will protect water resources will be provided.

- Household hazardous waste collection will be provided on a regular basis, for the Devens Enterprise Zone to reduce the chances of inappropriate disposal.

- Loading areas for both rail and new facilities will have safeguards to ensure the safe transfer of goods and commodities.

- Motorized off-road recreational vehicles will be precluded in all non-developed areas of the Devens Enterprise Zone.

Construction Requirements

All Zones

- Each development requiring a Development Permit will develop a site-specific erosion and sedimentation control plan.

- A Devens Stormwater Pollution Prevention Plan will be developed for all future construction to guide individual development proposals.

- Machinery maintenance and refueling will be restricted to designated areas.

- Each development must designate construction debris containment and temporary storage areas.

- Construction planning for new development should be prepared to use pre-existing disturbed sites and to minimize new site clearing and disturbance.

- If the development site is within 100 feet of an edge of wetland, the applicant shall file a Notice of Intent or equivalent document with the Devens Enterprise Commission for purposes of review with respect to wetlands protection, which shall be in accordance with federal, state, and Devens Enterprise Zone regulations.

Water Conservation Plan

All Zones

Encourage water conservation through the following:

- Increase efficiency of all users through the promotion of water conservation measures for business and residential users.

- Provide public education on water conservation.

- Require water conserving plumbing fixtures consistent with Massachusetts plumbing code.

Stormwater Management

Watershed Area

- Each development must employ stormwater control measures to reduce peak rates of runoff to pre-development conditions and to maintain or improve water quality. The area-wide stormwater management system will be phased-in on a site by site basis, coincident with development at each individual site. Where appropriate, systems must include:

    - Catch basins with traps and sumps

    - Oil/water separators

    - Flood controls/runoff controls

    - Ground water recharge facilities

    - Source reduction of sand and other debris on roads and in parking lots through sweeping and other maintenance measures

- A plan and process for the ongoing maintenance of stormwater facilities

- Plans and calculations should be provided with development proposals.

- The Devens Enterprise Commission shall enforce the ongoing maintenance of stormwater facilities and provide periodic inspection of facilities.

Aquifer Zone

All watershed provisions apply in addition to, or as modified by, the following provisions, for each development:

- Stormwater controls must provide for suspended solids removal and the interception of spills.

- Stormwater recharge must be provided to maintain or exceed current levels of recharge.

- Measures should be considered that help direct runoff away from sensitive surface water areas.

- Development proposals in the case of previously developed sites must demonstrate that water quality is being maintained or improved.

Zone II

All watershed and aquifer provisions apply in addition to, or as modified by, the following provisions, for each development:

- Filtration should be provided for ground water recharge areas.

- Development plans must include stormwater recharge to reduce or maintain total volume of runoff.

Storage and Application of Deicing Materials

The use of deicing agents is necessary to provide a high level of safety on Devens roads during winter months. Specific measures have been recommended for the water resource planning areas identified for the reuse of the base.

Watershed Area

- Piles of sodium chloride (road salt), chemically treated abrasive, and other chemicals used for the removal of ice and snow (collectively referred to as deicing materials) on roads should be stored under a roof on flat, impervious surfaces protected from runoff. Drainage controls should be in place to prevent direct runoff away from deicing material storage areas.

- Keep deicing materials dry through proper storage.

- Outfit deicing material spreading equipment with calibrated deicing material delivery systems for optimal control of the deicing material application rate. Calibrations shall be periodically checked to assure they are working properly.

- Provide education for operators of spreading equipment.

- Encourage a reduced salt application rate.

- Prohibit the direct application of 100 percent road salt to parking areas.

Aquifer Zone

All watershed provisions apply in addition to, or as modified by, the following provisions, for each development:

- Use of deicing materials for roadways is not to exceed the low-salt application rate of 150 lbs./lane mile.

- Encourage the use of alternative deicing materials for parking areas.

- Prohibit the direct application of 100 percent road salt to roads.

- Prohibit the stockpiling and/or disposal of snow or ice containing deicing materials from outside the Aquifer Zone.

Zone II

All watershed and aquifer provisions apply in addition to, or as modified by, the following provisions, for each development:

- Prohibit the stockpiling and/or disposal of snow or ice containing deicing materials from outside Zone II.

OPERATIONAL ACTIVITIES

Transportation of Hazardous Materials and Wastes

The control of movement of vehicles that transport hazardous materials and wastes, within the Devens Enterprise Zone, is necessary to minimize potential incidents. The following measures are required:

Watershed

- Transportation of hazardous materials and wastes must be in accordance will all federal and state regulations.

- Specific roadways within the Devens Enterprise Zone will be designated as primary access for use by carriers to deliver or remove products. These roadways include MacArthur, Sherman, Jackson, Patton, and Barnum

Roads. All of these roadways will be clearly marked and designated to facilitate safe transport of hazardous materials.

Aquifer Zone

All watershed provisions apply in addition to, or as modified by, the following provisions, for each development:

- As all designated primary routes are reconstructed, catch basins equipped to intercept floating product shall be installed and maintained.

Zone II

All watershed and aquifer provisions apply in addition to, or as modified by, the following provisions, for each development:

- For all designated primary routes, as roads are reconstructed spill interception and containment methods will be installed.

Hazardous Wastes and Materials

Watershed Area

Each development using hazardous materials and/or generating hazardous wastes must comply with these provisions:

- All activities associated with the generation, use, storage, and registration of, and emergency planning for hazardous wastes and materials must be in accordance with state and federal regulations.
- Secondary containment is required for all aboveground and underground storage tanks.
- Aboveground storage tanks and containers must be stored on a surface that does not have any cracks or gaps and is sufficiently impervious to contain leaks, spills, and accumulated precipitation.
- Any release must be promptly removed and reported to local and state authorities.
- Areas of storage and generation must be secured against unauthorized entry.
- Areas of storage must be clearly marked and separate from points of generation.
- Areas of storage and generation must be posted with a sign, "HAZARDOUS WASTES" or "HAZARDOUS MATERIALS," waste must be identified in words, and the date upon which accumulation began must be indicated.
- Separate containers of incompatible wastes by a berm, dike or similar structure.

- Each container and storage tank and each larger container into which smaller containers are packed must be clearly and visibly labeled throughout the period of accumulation.

- Each tank and storage container must be maintained in good condition.

- Each container holding hazardous wastes must be covered with a secure lid.

- Each development must allow periodic inspection of containers and storage tanks containing hazardous wastes and materials.

- Outside storage of hazardous wastes and materials is allowed in accordance with applicable federal, state, and Devens Enterprise Zone regulations.

- All hazardous wastes generated within the Devens Enterprise Zone must be disposed of or recycled at a licensed hazardous waste disposal facility.

- A registration and inspection program for hazardous materials should be established.

Aquifer Zone

All watershed provisions apply in addition to, or as modified by, the following provisions for each development:

- Requirements for storage of hazardous wastes and materials will be established and will remain in force as long as the use exists.

- Additional requirements for storage of hazardous wastes and materials may be established on an individual development basis.

- Each development storing hazardous materials or generating hazardous wastes beyond a specified amount, will be required to provide a materials-specific, storage-specific, and usage-specific addendum to the standard Devens Spill Prevention Control and Countermeasure Plan (DSPCC).

- Outdoor aboveground storage areas are allowed but must be covered wherever possible, have secondary containment with an impermeable layer, and have a berm or dike to hold any spills or leaks with capacity to hold 110 percent of the maximum volume stored.

Zone II

All watershed and aquifer provisions apply in addition to, or as modified by, the following provisions for each development:

- Those who generate, treat, store, or dispose of hazardous waste will be limited to Very Small Quantity Generators (VSQGs) as defined under state regulations.

- Outdoor storage of hazardous waste is prohibited.

Pesticides and Herbicides

Watershed Area

- State and federal regulations apply.
- For all non-residential application, chemicals stored on site must be registered in accordance with federal, state, and local regulations.
- Chemicals must be applied in accordance with authorized uses, label directions and other state or federal requirements.
- Spray equipment must be properly calibrated and maintained.
- Indoor storage areas must be clearly marked.
- Disposal of wastes and waste collected in a holding tank must be disposed of through a licensed waste transporter.
- Buildings used for storage must have a spill collection system in place.
- Mixing areas for pesticides should be located away from floor drains such that leaks or spills cannot enter floor drains. All indoor and outdoor mixing areas should be self-contained so they cannot drain into the wastewater or stormwater systems.
- Personnel training regarding storage, use, and handling of pesticides and herbicides should be ongoing.

Aquifer Zone

All watershed provisions apply in addition to, or as modified by, the following provisions, for each development:

- Outdoor storage facilities must be covered and must have secondary containment.
- Restrict the use of pesticides and herbicides contained in the state Pesticide Board Groundwater Protection List (GPL).

Zone II

All watershed and aquifer provisions apply in addition to, or as modified by, the following provisions, for each development:

- Require approval of a Pesticide Management Plan (PMP) in order to apply any product on the GPL.

Fertilizers

All Zones

- Encourage the use of fertilizer alternatives.
- Investigate the use time-release fertilizers.
- Encourage limited application of any type of fertilizer.
- Ensure proper storage of fertilizers to protect from runoff.
- Establish a monitoring program for fertilizer application to sites that are ten acres or greater.
- Test soil annually to determine annual fertilizer needs.

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GREEN INFRASTRUCTURE GUIDELINES FOR DEVENS PROJECTS

The redevelopment of the Devens Regional Enterprise Zone (Devens) is guided by the principles of sustainable development – recognizing the long-range consequences of current actions. This approach to redevelopment also recognizes the economic, social and environmental impacts of redevelopment and the interconnectedness of these triple-bottom line aspects of sustainable development. The Devens Enterprise Commission (DEC) Rules and Regulations governing the redevelopment of Devens contain a number of sustainable design standards that promote the conservation and integration of the natural environment with the built environment. In Devens, where and how you build is just as important as what you build. Connectivity of infrastructure services (roads, sewers, utilities, etc…) is important from a development perspective but so is connectivity of the natural environment to support biodiversity and help ensure preservation of important ecosystem services such as wildlife habitat, natural stormwater management and filtration, carbon capture and sequestration. Devens has been redeveloped with sufficient hard infrastructure to support the energy, water, sewer and transportation needs of the built environment, while also connecting to and preserving important components of the natural environment. This approach results in high quality, attractive and functional development patterns that have proven to be more cost effective than traditional development techniques – further enhancing the sustainable redevelopment goals of Devens. This document is intended to provide applicants with a better understanding of what Green Infrastructure is, the local incentives to promote Green Infrastructure, and guidance on how to strategically locate and incorporate Green Infrastructure into projects to meet multiple regulatory requirements within the DEC Rules and Regulations.

What is Green Infrastructure?

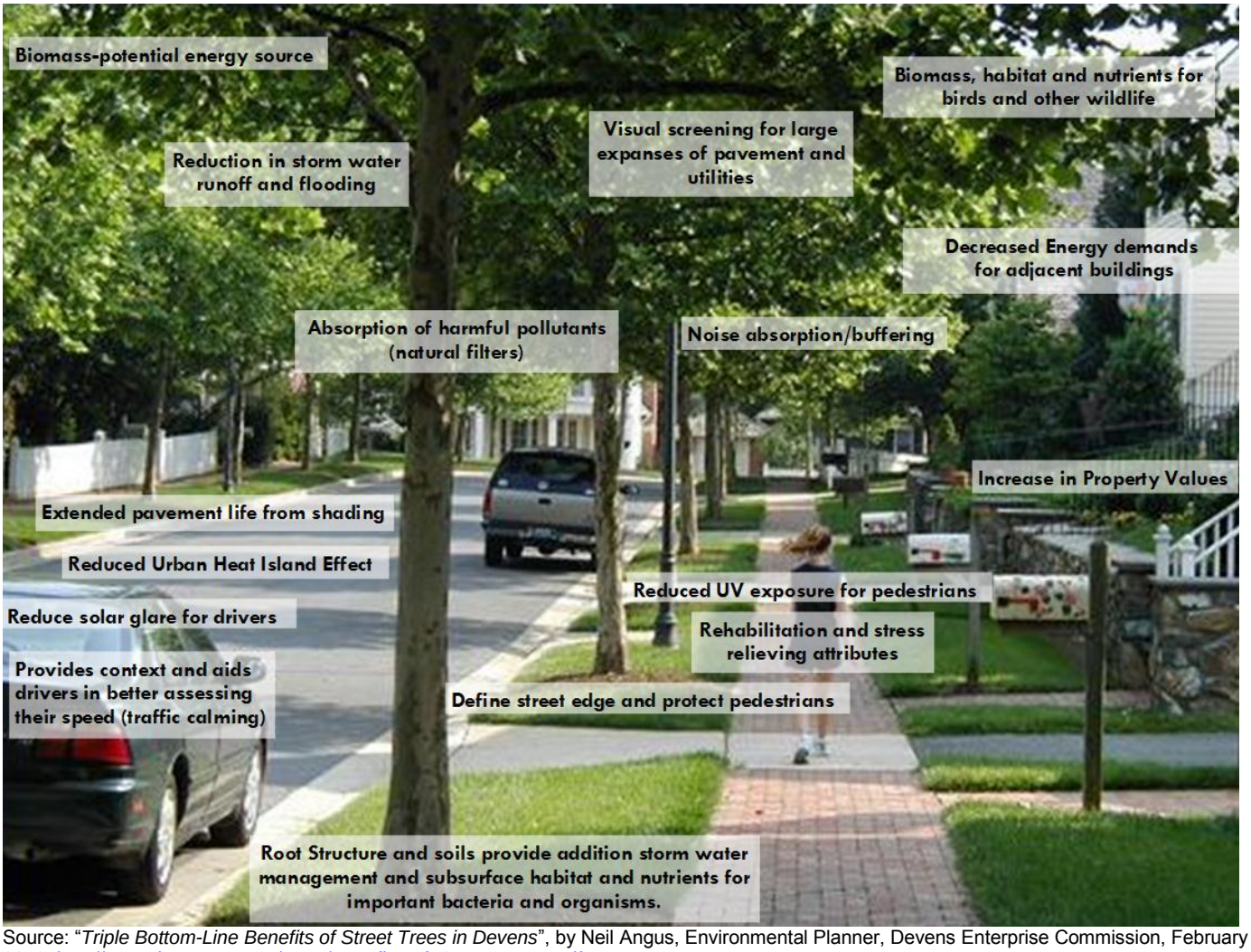
Green Infrastructure refers to natural, constructed, or restored landscape features that support fish, aquatic and terrestrial wildlife habitat and provide natural (and free!) ecosystem services such as water filtration and recharge; temperature moderation; erosion control; carbon capture and pollutant control; nutrient management, and food production. Green Infrastructure features may be natural such as forests, trail systems, floodplains, wetlands and buffer areas, or built/engineered features such as street trees, rain gardens, green roofs, bioretention areas and constructed wetlands (low-impact development or LID) that mimic or restore natural ecological processes. Green Infrastructure elements also help reduce wildlife habitat fragmentation and provide the ability for developments to better adapt to changing weather patterns through more direct and natural methods of stormwater management and infiltration which decrease flooding threats– resulting in less impacts from hazards (improved resiliency). Green Infrastructure in Devens also includes energy efficiency and renewable energy measures that help create a more sustainable network of built and natural systems. Incorporating Green Infrastructure elements into development projects can help meet your corporate sustainability objectives and the DEC regulations, all while saving money and enhancing the natural and built environment within Devens.

The Devens Open Space and Recreation Plan, Devens Main Post Trails Plan, Water Resources Protection Report and Stormwater Pollution Prevention Plan were all drafted as part of the planning and redevelopment for Devens. These plans and reports identify important natural areas and systems within Devens and the surrounding region and recommend certain levels of conservation and protection. Well planned developments can strategically identify these resource areas (i.e., wetlands, watercourses, steep slopes) and preserve and incorporate these elements and associated buffers as green infrastructure components and meet development screening, landscaping, water quality and viewshed protection requirements, while preserving the ecological structure and function of these natural areas at the same time.

Traditional parking lot design(curb, gutter and catch basin)

Low-Impact Development parking lot design (biofiltration)

Green Infrastructure elements are incorporated throughout the current DEC Rules and Regulations. A single Green Infrastructure element such as street trees or parking lot landscaping can be utilized to meet multiple regulatory requirements and sustainability objectives within the DEC Rules and Regulations:



Source: "*Triple Bottom-Line Benefits of Street Trees in Devens*", by Neil Angus, Environmental Planner, Devens Enterprise Commission, February 2012. http://www.devensec.com/news/Benefits_of_Street_Trees.pdf

As the above graphic shows, street tree plantings can replicate many natural ecosystem services and can act as corridors or connections to larger, unfragmented ecological habitats as well as provide many added benefits for people and properties nearby (triple-bottom line attributes of sustainable development). All of these benefits also apply to the vegetative screening that Devens requires for parking lots. A listing of Green Infrastructure elements and the corresponding DEC regulations that these elements address are listed in Appendix A. Graphic examples of commercial and residential Green Infrastructure applications can also be found in Appendix B.

Green Infrastructure Incentives in Devens:

The DEC offers a number of regulatory and financial incentives for projects that incorporate certain sustainable and green infrastructure elements:

Expedited Permitting: To Applicants, time is money. It is often said, the greenest of green buildings is often the adaptive reuse of existing buildings. The DEC recognizes these points and has committed to a maximum 21-day permitting timeframe for projects utilizing existing buildings (where no exterior site improvements are required). This helps reduce the environmental footprint of new development and expands on the DEC's already expedited Unified Permitting Process which commits to Level 2 Unified Permitting of projects within 75 days.

Stormwater Management Credit for Green Roofs: For projects that incorporate vegetated roofs, the area of roof covered by vegetation may be considered pervious and subtracted from the total proposed impervious area [974 CMR 4.08(5)]. This reduces the overall quantity of stormwater that is required to be managed on-site and can reduce the size of associated stormwater management systems, thereby saving land and money.

Relaxed Frontage Requirements for more Energy &Water Efficient Development: Applicants that agree to construct residential projects to a Home Energy Rating System (HERS) of 60 or less and incorporate EPA Water Sense labeled plumbing fixtures in all buildings are eligible for reduced lot frontage requirements. This allows for more

clustered approaches to development which reduces the development footprint and associated infrastructure costs [974 CMR 5.02(2)].

***Additional Street Types**:* The DEC recently revised its Regulations to include additional street types which allow for reduced pavement widths and /infrastructure costs (refer to 974 CMR 2.07).

Renewable Energy Building and Electrical Permit Fee Reductions: to incentivize the integration of Renewable Energy Facilities at Devens and further promote clean energy, greenhouse gas reduction and improved air quality; the DEC has adopted a reduced Unified, Building and Electrical Permit fee schedule for renewable energy installations for both ground-mounted and building mounted/integrated systems.

Financial incentives for LEED projects: The US Green Building Council's Leadership in Energy and Environmental Design (LEED) green building certification program requires a number of green infrastructure components be designed and constructed into a project that is pursuing certification (landscaping, energy efficiency, low-impact stormwater management, reduced development footprint management, etc…). As this program embodies the same sustainable development principles as Devens, completed projects that achieve LEED certification can be reimbursed up to 15% of their unified permit fee (maximum $10,000).

Green Infrastructure in Devens – Low-Impact Development/Bio-Filtration Landscape Island Case Study:
One Jackson Place (27 Jackson Road, Devens, MA)

Total Traditional Project Cost:	**$1,004,000**
LID Reduced site paving	-$32,000
LID Reduced curbing	-$50,000
LID Reduced stormwater piping	-$14,000
LID Reduced stormwater structures	-$68,000
LID Increased landscaping	+$12,000
LID Increased site preparation	+$10,000
LID Increased soil mix	+$18,000
Total Estimated LID Savings:	**-$124,000 (12%)**

Depressed landscape islands with specialized plantings and soil mix to naturally filter and infiltrate stormwater runoff while providing wildlife habitat connections through the site to adjacent larger forested areas.

For additional information or questions, please contact Devens Enterprise Commission staff
neilangus@devensec.com or 978.772.8831.

Resources:

1. UNH Stormwater Center: http://www.unh.edu/unhsc/– Case Studies on economics of LID techniques: http://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/docs/FTL_Resource%20Manual_LR.pdf
2. Devens LID Case Study: www.devensec.com/sustain.htm
3. MA Smart Growth/Smart Energy Toolkit: http://www.mass.gov/envir/smart_growth_toolkit/pages/mod-lid.html
4. MA DEP Stormwater Management Standards Structural Specifications for BMP's: http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/v2c2.pdf
5. BioMap 2: Conserving the Biodiversity of Massachusetts in a Changing World: http://maps.massgis.state.ma.us/dfg/biomap2.htm

Green Infrastructure Guidelines:

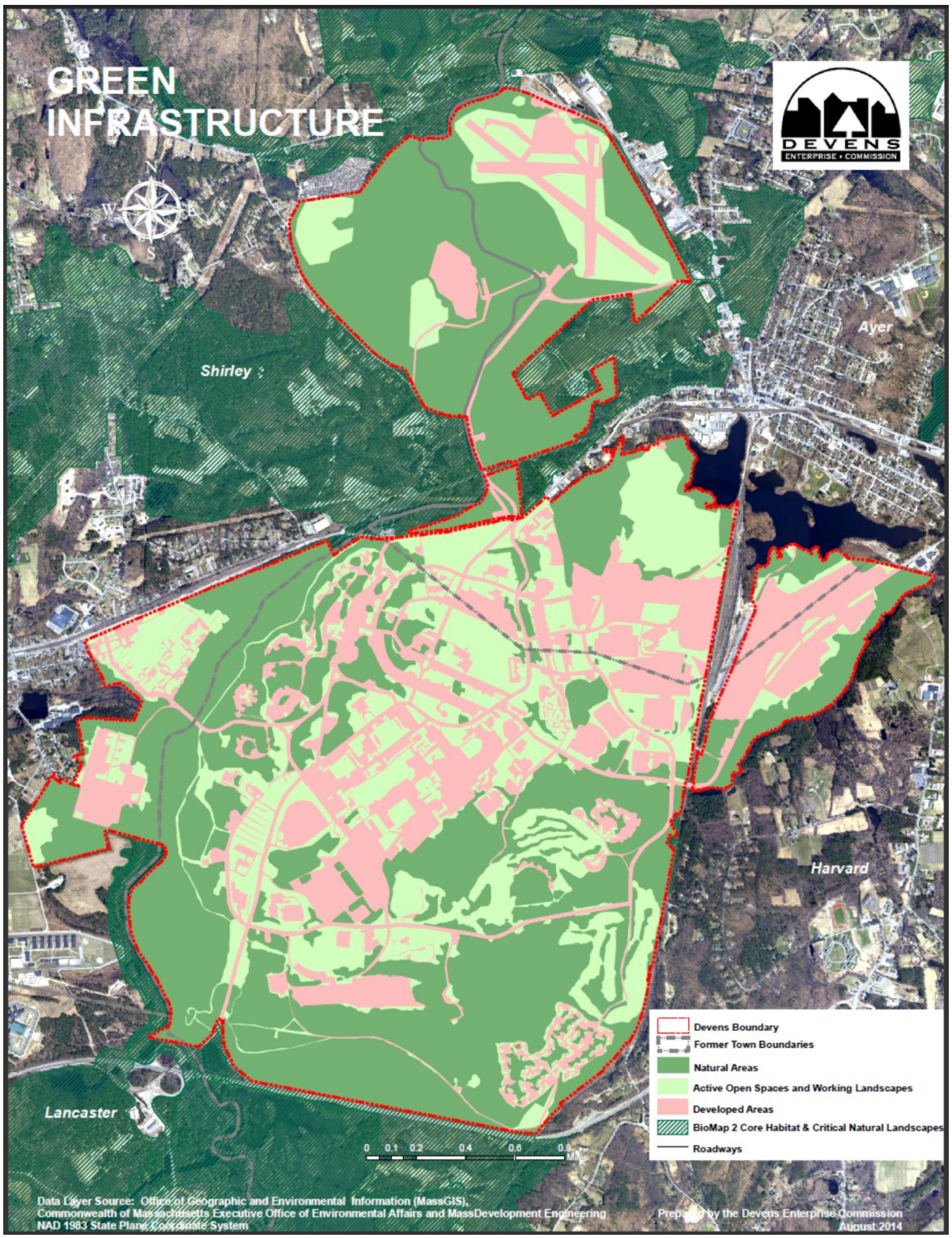
1. **Green Infrastructure Objectives.** All development projects within Devens should be designed to incorporate Green Infrastructure elements that meet one or more of the following objectives:
    a. **Protect and use existing vegetation.** Minimize disruption to existing habitats by incorporating site design that protects existing healthy and native vegetation and minimizes the development footprint (tight construction disturbance zone limits).
    b. **Facilitate connections.** Incorporate landscape design elements into all proposed projects to facilitate green infrastructure connections/linkages to surrounding natural landscapes to the maximum extent feasible. 974 CMR 3.04(8)(d)5. requires areas of previously cleared woodlands that are not utilized on project sites to be re-planted with native woodland species. Edges of previously cleared woodlands on-site are also required to be planted with mix of vegetation types.
    c. **Vegetation types**. Support biodiversity, reduced pesticide use, and water conservation by using native plants species that have adapted to site conditions and local climate zones (see 974 CMR 3.06 Appendix A for a list of native plants). Also prohibit planting of invasive species (a full and updated list is available from the Invasive Plant Atlas of New England – IPANE).
    d. **Energy/Micro-climate.** Reduce building energy consumption by maximizing solar orientation of buildings and incorporating passive energy design features to maximize energy efficiency to the maximum extent practicable. Projects are encouraged to consider the placement of appropriate vegetation or vegetated structures in strategic locations adjacent to buildings. Projects may also be designed to offset additional building energy demands to the maximum extent practicable through added efficiencies such as district energy systems and/or renewable energy systems. Where feasible, projects may also incorporate urban heat island reduction elements such as shade trees, green roofs, or vegetated structures to cover non-vegetated surfaces such as walls, walkways and parking lots.
    e. **LID/Stormwater Management.** Use low-impact development stormwater management techniques to facilitate green infrastructure connections throughout proposed developments.
    f. **Landscape Management.** Develop long-term invasive species monitoring, control and removal program as part of the Long Term Operations and Maintenance Plan for the site. Refer to Appendix B for examples of Commercial/Industrial and Residential Applications.
2. **The Devens Green Infrastructure and Landscape Matrix Map** divide Devens into three (3) landscape areas/classifications. Projects located within one or more of these areas are encouraged to incorporate green infrastructure components that are functional and facilitate connections to or enhance larger contiguous landscape patches. See ***Appendix A*** for a list of Green Infrastructure technologies and ***Appendix B*** for graphic examples of Commercial/Industrial and Residential Applications.

DEVENS GREEN INFRASTRUTURE AND LANDSCAPE MATRIX

Dark Green: **Natural Lands.** All proposed projects within these areas may preserve and incorporate green infrastructure linkages and connections within these areas in accordance with DEC Landscaping requirements 974 CMR 3.04(8).

Light Green: **Active Open Spaces, Working Landscapes and Existing LID**. All proposed projects within these areas may incorporate landscape designs that connect to/expand existing Natural lands within the immediate vicinity in accordance with 974 CMR 3.04(8)(d)5. and 974 CMR 3.04(8) in general.

Red: **Developed Areas.** All proposed projects within these areas may incorporate landscape designs in accordance with 974 CMR 3.04(8) that, where feasible, facilitate connections to surrounding Natural Lands, Active Open Spaces, Working Landscapes and Existing LID as per 974 CMR 3.04(8)(d)5.



**Core Habitat and Critical Natural Landscapes from the BioMap 2 are shown in green hash marks outside of Devens boundaries. These areas are generally contiguous with "Natural Lands" within Devens, further emphasizing the importance of maintaining and facilitating green infrastructure connections to and from these areas.*

APPENDIX A – Devens Green Infrastructure Elements:

Below is a list of green infrastructure elements and technologies that should be considered by all Applicants, along with links to the applicable DEC regulations that such components can satisfy. As this table demonstrates, many individual green infrastructure components can satisfy multiple regulatory requirements. Please note, the DEC supports innovation and recognizes this is not a complete list of Green Infrastructure elements and technologies. New or alternative Green Infrastructure elements and technologies not listed below may be acceptable, provided the Applicant demonstrates to the DEC the appropriateness of such measures in meeting the applicable provisions of the DEC Rules and Regulations.

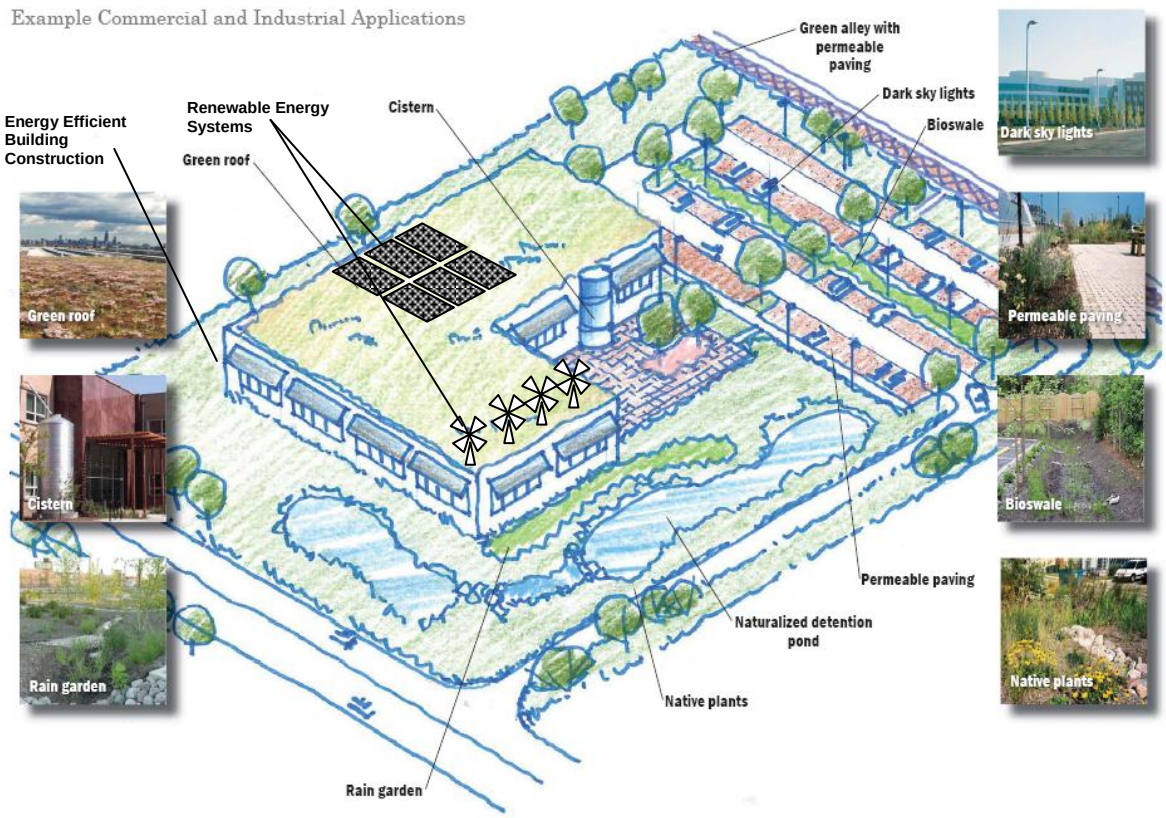
GREEN INFRASTRUCTURE ELEMENTS	EXAMPLES OF DEC REGULATIONS ADDRESSED
General Landscape Design Elements:	
Preservation of tracts/corridors of existing native vegetation, topography and native wildlife habitat.	Stormwater Management - 974 CMR 3.04(4) Topographic Alterations – 974 CMR 3.04(5) Site Improvements - sidewalks/trails 974 CMR 3.04(6)(d) Preservation of existing vegetation - 974 CMR 3.04(8)(d) Restoration of vegetation - 974 CMR 3.04(8)(d)5. Use of native plants - 974 CMR 3.04(8)(c) Minimize lawn areas 974 CMR 3.04(8)(f) Viewshed Overlay Districts - 974 CMR 3.04(8)(i) Steep Slope Protection – 974 CMR 3.06 Industrial performance standards for light and noise - 974 CMR 4.04 &5 Wetland Protection 974 CMR 4.06 Water Resource Protection – 974 CMR 4.09 Greenhouse Gas Mitigation – 974 CMR 4.11 Innovative Residential Development – 974 CMR 5.02(1)(k)
Restoration of habitat	Preservation of existing vegetation - 974 CMR 3.04(8)(d) Topographic Alterations – 974 CMR 3.04(5) Screening - 974 CMR 3.04(8)(g) Wetland Protection 974 CMR 4.06 Water Resource Protection – 974 CMR 4.09 Greenhouse Gas Mitigation – 974 CMR 4.11
Trails and greenway connections	Site Improvements - sidewalks/trails 974 CMR 3.04(6)(d) Stormwater Management - 974 CMR 3.04(4) Greenhouse Gas Mitigation – 974 CMR 4.11 Innovative Residential Development – 974 CMR 5.02(1) and (2)
Landscaping Plantings	Use of native plants - 974 CMR 3.04(8)(c) Screening - 974 CMR 3.04(8)(g) Minimize lawn areas 974 CMR 3.04(8)(f) Parking Landscaping requirements - 974 CMR 3.04(8)(h) Industrial performance standards for light and noise - 974 CMR 4.04 &5 Greenhouse Gas Mitigation – 974 CMR 4.11
Control and management of invasive species	Use of native plants - 974 CMR 3.04(8)(c) Maintenance requirements:- 974 CMR 3.04(8)(n) Wetland Protection 974 CMR 4.06
Impervious surface reductions (urban heat island)	Parking Landscaping requirements - 974 CMR 3.04(8)(h) Industrial performance standards for light and noise - 974 CMR 4.04 &5 Parking maximums - Devens Bylaws Article C Stormwater Management - 974 CMR 3.04(4) Innovative Residential Development – 974 CMR 5.02(1) and (2) Vegetated roofs and walls - 974 CMR 3.04(8)(g)(i)(5)
Reduce/eliminate potable water use for irrigation	Xeriscaping and greywater reuse 974 CMR 3.04(8)(c) Use of native plants - 974 CMR 3.04(8)(c) Minimize lawn areas - 974 CMR 3.04(8)(f) Maintenance requirements - 974 CMR 3.04(8)(n) Stormwater Management - 974 CMR 3.04(4) Water Resource Protection – 974 CMR 4.09 Controls on in-ground irrigation systems - 974 CMR 8.09(11)
Created Wetlands	Screening - 974 CMR 3.04(8)(g) Use of native plants - 974 CMR 3.04(8)(c) Stormwater Management - 974 CMR 3.04(4) Stormwater Management Design Standards – 974 CMR 4.08 Water Resource Protection – 974 CMR 4.09
Preservation of Steep Slopes	Screening - 974 CMR 3.04(8)(g) Slope Resource Areas - 974 CMR 3.06 Innovative Residential Development – 974 CMR 5.02(1) and (2)
Vegetative screening	Screening - 974 CMR 3.04(8)(g) Use of native plants - 974 CMR 3.04(8)(c) Building façade screening requirements:- 974 CMR 3.04(8)(l) Industrial performance standards for light and noise - 974 CMR 4.04 &5 Parking Landscaping requirements - 974 CMR 3.04(8)(h) Viewshed Overlay Districts - 974 CMR 3.04(8)(i) Greenhouse Gas Mitigation – 974 CMR 4.11

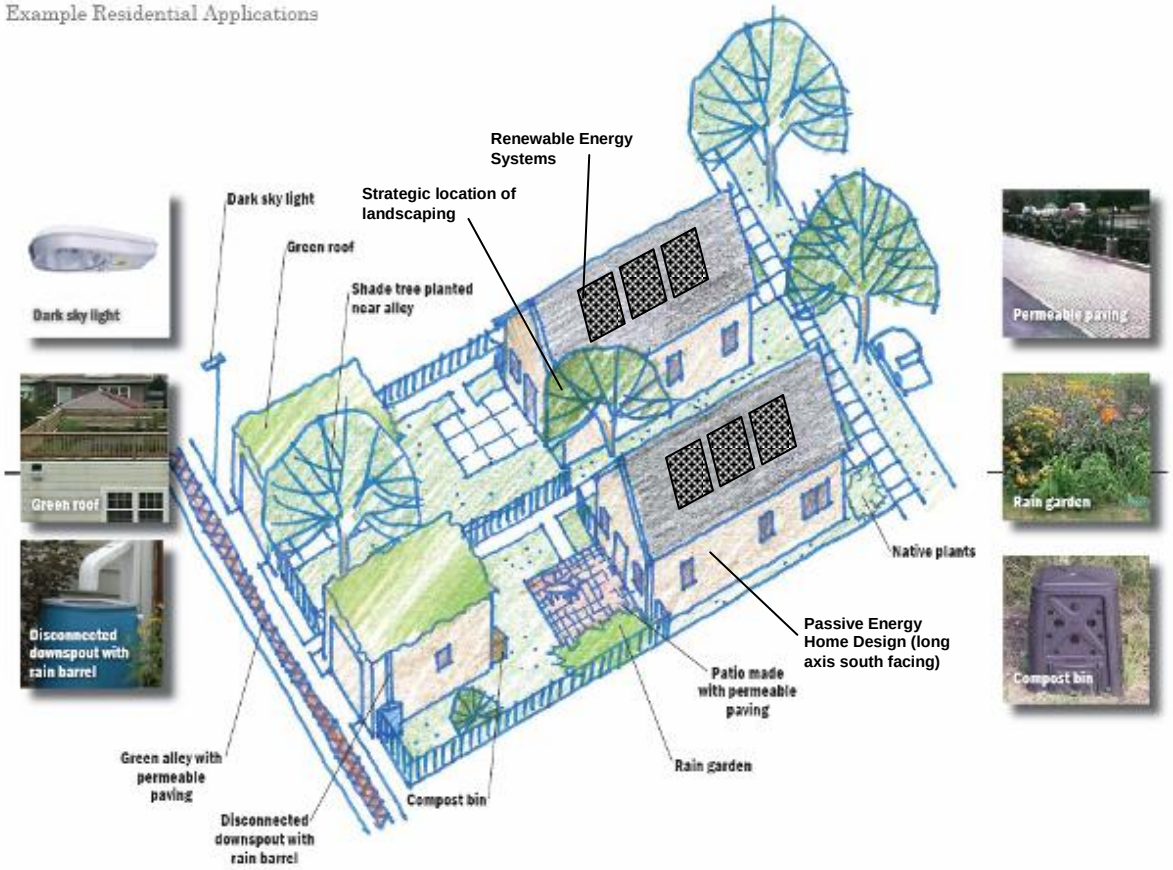
GREEN INFRASTRUCTURE ELEMENTS	EXAMPLES OF DEC REGULATIONS ADDRESSED
General Landscape Design Elements cont…	
Edible landscapes	Plants lists – 974 CMR 3.07(5) Innovative Residential Development – 974 CMR 5.02(1) and (2) Vegetated roofs and walls - 974 CMR 3.04(8)(g)(i)(5)
Building and Site Design Elements:	
Low-Impact Development Stormwater Mgm't - on-site stormwater management requirements	Stormwater Management - 974 CMR 3.04(4) Stormwater Management Design Standards – 974 CMR 4.08 Parking Landscaping requirements - 974 CMR 3.04(8)(h) Water Resource Protection – 974 CMR 4.09 Innovative Residential Development – 974 CMR 5.02(1) and (2) Vegetated roofs and walls - 974 CMR 3.04(8)(g)(i)(5)
Minimizing building heating and cooling requirements with landscaping	Screening - 974 CMR 3.04(8)(g) Building façade screening requirements:- 974 CMR 3.04(8)(l) Vegetated roofs and walls - 974 CMR 3.04(8)(g)(i)(5) Industrial performance standards for light and noise - 974 CMR 4.04 &5 Greenhouse Gas Mitigation – 974 CMR 4.11
Manage, improve, recharge and reuse stormwater on-site to the maximum extent feasible	Screening - 974 CMR 3.04(8)(g) Stormwater Management - 974 CMR 3.04(4) Vegetated roofs and walls - 974 CMR 3.04(8)(g)(i)(5) Stormwater Management Design Standards – 974 CMR 4.08 Water Resource Protection – 974 CMR 4.09 Controls on in-ground irrigation systems - 974 CMR 8.09(11)
Rain gardens	Use of native plants - 974 CMR 3.04(8)(c) Stormwater Management - 974 CMR 3.04(4)\ Stormwater Management Design Standards – 974 CMR 4.08 Water Resource Protection – 974 CMR 4.09
Decentralized infiltration systems	Use of native plants - 974 CMR 3.04(8)(c) Stormwater Management - 974 CMR 3.04(4) Vegetated roofs and walls - 974 CMR 3.04(8)(g)(i)(5) Stormwater Management Design Standards – 974 CMR 4.08 Water Resource Protection – 974 CMR 4.09
Rain barrels/cisterns	Stormwater Management - 974 CMR 3.04(4)\ Maintenance requirements:- 974 CMR 3.04(8)(n) Water Resource Protection – 974 CMR 4.09 Controls on in-ground irrigation systems - 974 CMR 8.09(11)
Green roofs/green walls (refer to DEC Vegetated Roof Policy)	Screening - 974 CMR 3.04(8)(g) Vegetated roofs and walls - 974 CMR 3.04(8)(g)(i)(5) Water Resource Protection – 974 CMR 4.09 Use of native plants - 974 CMR 3.04(8)(c) Building façade screening requirements:- 974 CMR 3.04(8)(l) Stormwater Management - 974 CMR 3.04(4) Stormwater Management Design Standards – 974 CMR 4.08 Greenhouse Gas Mitigation – 974 CMR 4.11
Minimizing cut and fill and development footprint	Topographic Alterations – 974 CMR 3.04(5) Preservation of existing vegetation - 974 CMR 3.04(8)(d) Minimize lawn areas 974 CMR 3.04(8)(f) Industrial performance standards for light and noise - 974 CMR 4.04 &5 Water Resource Protection – 974 CMR 4.09 Innovative Residential Development – 974 CMR 5.02(1) and (2) Greenhouse Gas Mitigation – 974 CMR 4.11
Naturalized Erosion and Sediment Controls	Plan requirements - 974 CMR 3.02(3)(e) Stormwater Management - 974 CMR 3.04(4) Stormwater Management Design Standards – 974 CMR 4.08 Water Resource Protection – 974 CMR 4.09
Infrastructure Elements*:	
Street types/widths, stormwater mgm't and landscape treatments within Road Rights-Of-Ways (ROW)	Landscaping Requirements within ROW - 974 CMR 2.07(2) and (7) Use of native plants - 974 CMR 3.04(8)(c) Industrial performance standards for light and noise - 974 CMR 4.04 &5 Stormwater Management for Streets – 974 CMR 2.07(6) Greenhouse Gas Mitigation – 974 CMR 4.11 Innovative Residential Development – 974 CMR 5.02(1)(e)
Traffic calming measures incorporating landscaping/biofiltration	Traffic calming - 974 CMR 2.07(3) Stormwater Management for Streets – 974 CMR 2.07(6) Use of native plants - 974 CMR 3.04(8)(c) Street tree requirements - 974 CMR 3.04(8)(k) Industrial performance standards for light and noise - 974 CMR 4.04 &5 Greenhouse Gas Mitigation – 974 CMR 4.11 Innovative Residential Development – 974 CMR 5.02(1) and (2)
Permeable and pervious paving systems	Stormwater Management - 974 CMR 3.04(4) Stormwater Management Design Standards – 974 CMR 4.08

GREEN INFRASTRUCTURE ELEMENTS	EXAMPLES OF DEC REGULATIONS ADDRESSED
Infrastructure Elements*cont…:	
Street trees with tighter spacing (30-40' vs. traditional 50')	Street tree requirements - 974 CMR 3.04(8)(k) Industrial performance standards for light and noise - 974 CMR 4.04 &5 Screening - 974 CMR 3.04(8)(g) Use of native plants - 974 CMR 3.04(8)(c) Greenhouse Gas Mitigation – 974 CMR 4.11 Innovative Residential Development – 974 CMR 5.02(1) and (2)
Biofiltration swales	Use of native plants - 974 CMR 3.04(8)(c) Stormwater Management - 974 CMR 3.04(4) Stormwater Management Design Standards – 974 CMR 4.08
Floodplain, stream, wetland, riparian buffer protection and/or restoration	Wetland Protection 974 CMR 4.06 Stormwater Management - 974 CMR 3.04(4) Stormwater Management Design Standards – 974 CMR 4.08 Greenhouse Gas Mitigation – 974 CMR 4.11
Community parks/permanently protected open space	Greenhouse Gas Mitigation – 974 CMR 4.11 Use of native plants - 974 CMR 3.04(8)(c) Stormwater Management - 974 CMR 3.04(4) Preservation of existing vegetation - 974 CMR 3.04(8)(d) Site Improvements - sidewalks/trails 974 CMR 3.04(6)(d) Restoration of vegetation - 974 CMR 3.04(8)(d)5. Innovative Residential Development – 974 CMR 5.02(1)(k)
Community gardens	Innovative Residential Development – 974 CMR 5.02(1) and (2)
Integrated waste management systems	Greenhouse Gas Mitigation – 974 CMR 4.11
Water Conservation and Efficiency	Use of native plants - 974 CMR 3.04(8)(c) Stormwater Management - 974 CMR 3.04(4) Maintenance requirements:- 974 CMR 3.04(8)(n) Greywater reuse - MA DEP regulatory provisions for greywater systems Innovative Residential Development – 974 CMR 5.02(1) and (2) Controls on in-ground irrigation systems - 974 CMR 8.09(11)
Ground source heat pumps, cogeneration and other energy efficiency infrastructure	Greenhouse Gas Mitigation – 974 CMR 4.11 Innovative Residential Development – 974 CMR 5.02(1) and (2)
District energy systems	Innovative Residential Development – 974 CMR 5.02(1) and (2) Greenhouse Gas Mitigation – 974 CMR 4.11
Renewable energy systems (including solar canopies for renewable energy generation and heat-island reduction)	Renewable Energy Facility Requirements – 974 CMR 4.10 Greenhouse Gas Mitigation – 974 CMR 4.11

*Transportation demand management programs that reduce single occupancy vehicle trips and promote alternative modes of transportation also contribute to reduced greenhouse gas emissions and improved public health and therefore qualify as green infrastructure components. For details on TDM in Devens, go to: http://www.devensec.com/development/TMI_Overview.pdf

APPENDIX B - Example Commercial, Industrial and Residential Applications:





Base drawings from the Chicago Green Alley Handbook. This information is being provided for informational purposes to assist applicants as part of the Devens Enterprise Commission expedited Unified Permitting process.

Massachusetts Stormwater Standards
Standard 10
Illicit Discharge Compliance Statement

Site Address: _____

Owner: _____

Plan Reference: _____

Date: _____

As required by Standard 10 of the Massachusetts Stormwater Standards, I, the undersigned, being the authorized owner/responsible party of the above-referenced property do hereby certify that no illicit discharges exist on the site and that the stormwater system, as shown on the above-referenced plan, does not contain or permit any illicit discharges to enter the stormwater management system. Illicit discharges do not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents.

The pollution prevention plan measures implemented in this project to prevent illicit discharges to the stormwater management system, including wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease, include:

1. (please list)
2.

Further, I certify that the stormwater management system as shown on the referenced plan will be maintained in accordance with the conditions of the LongTerm Pollution Prevention Plan.

Name: _____

Signed: _____

Date: _____

Please note: *The Illicit Discharge Compliance Statement must be accompanied by or properly reference a site map that is drawn to scale and that identifies the location of any systems for conveying stormwater on the site and shows that these systems do not allow the entry of any illicit discharges into the stormwater management system. The site map shall identify the location of any systems for conveying wastewater and/or groundwater on the site and show that there are no connections between the stormwater and wastewater management systems and the location of any measures taken to prevent the entry of illicit discharges into the stormwater management system. For redevelopment projects, the Illicit Discharge Compliance Statement shall also document all actions taken to identify and remove illicit discharges, including, without limitation, visual screening, dye or smoke testing, and the removal of any sources of illicit discharges to the stormwater management system.*

DEVENS ENTERPRISE COMMISSION
33 Andrews Parkway
Devens, MA 01434

P. 978-772-8831 F. 978-772-1529

PERMIT NO. _____

DEC No. _____

APPLICATION DATE: _____

FEE _____
($13./$1,000. of value up to $1 million
$11./$1,000. of value after $1 million
Minimum fee: $50.00)

BUILDING PERMIT APPLICATION

Note: The Devens Building Commissioner is available Wednesday from 10 AM to 12 PM.
To avoid delays in processing your application, submit all required information together. Incomplete application packages cannot be processed. Fill out application form completely and legibly.

==========

ESTIMATED COST OF CONSTRUCTION _____

OWNER _____ BUILDER _____

ADDRESS _____ ADDRESS _____

TOWN/STATE _____ TOWN/STATE _____

PHONE _____ PHONE _____

FAX _____ FAX _____

OWNER SIGNATURE _____

CONST. SUPER. LIC. NO. _____ HIC REGISTRATION _____

NOTE: A photocopy of your "CONSTRUCTION SUPERVISORS LICENSE" along with 'PHOTO IDENTIFICATION' are required at the time you file this application.

JOBSITE / LOCATION / STREET _____

LOT SIZE / TOTAL PARCEL_____ MAP/BLOCK/LOT _____

==========

SCOPE OF WORK (pick the one which best fits your project)

____ New Construction ____ Renovations / Additions / Repairs

____ Roofing ____ Other (Explain)

Is this building located in the Historic District? Yes _____ No _____

Please provide details of work to be performed (including square footage):

_____

_____

_____

BUILDING PERMIT APPLICATION (continued)

==========

TRASH DISPOSAL AFFIDAVIT

As a result of the provisions of MGL "C40, S54", I acknowledge that as a condition of the BUILDING PERMIT, all debris resulting from the construction activity governed by the BUILDING PERMIT shall be disposed of in a properly licensed solid waste disposal facility, as defined by MGL "C 111, S 150a". Disposal at a licensed Construction & Demolition Debris Recycling Facility is the preferred method of disposal.

I certify that I will notify the Inspector of Buildings by _____ (max. of 2 months) of the location of the solid waste disposal facility where the debris resulting from said construction activity shall be disposed of, and I shall submit the appropriate form for attachment to the Building Permit.

_____ DATE

_____ SIGNATURE OF PERMIT APPLICANT

PRINT THE FOLLOWING INFORMATION

_____ NAME OF PERMIT APPLICANT

_____ NAME OF WASTE REMOVAL COMPANY

_____ FIRM NAME (IF ANY)

_____ ADDRESS

_____ ADDRESS

_____ TOWN, STATE, ZIP CODE

_____ TOWN, STATE, ZIP CODE

_____ PHONE NUMBER AND AREA CODE

==========

SOIL MANAGEMENT

Is soil being disturbed as part of this project?

_____ YES _____ NO

If YES – As Devens is a former active military installation, it is possible that Unexploded Ordinance (UXO) or Munitions of Explosive Concern (MEC) and environmental contaminants may exist and/or be encountered at Devens. Prior to commencing any intrusive earth work within Devens, all personnel to be on-site shall comply with the requirements of MassDevelopment's Devens Soil Management Policy as amended. As per the Devens Soil Management Policy, MassDevelopment is required to provide UXO/MEC training. Applicants shall contact the Devens Public Safety Officer to coordinate training.

WORKERS' COMPENSATION INSURANCE AFFIDAVIT

NAME _____

LOCATION _____

TOWN _____ PHONE NO. _____

_____ I am the property owner and will be performing all work myself.

_____ I am a sole proprietor and have no one working for me in any capacity.

==========

_____ I am an employer providing workers' compensation for my employees working on this job.

COMPANY NAME _____

BUSINESS ADDRESS _____

TOWN, STATE, ZIP _____ PHONE NO. _____

INSURANCE CO. _____ POLICY NO. _____

==========

_____ I am a sole proprietor, general contractor, or property owner (circle one) and have hired the contractors listed below who have the following workers' compensation policies:

COMPANY NAME _____

BUSINESS ADDRESS _____

TOWN, STATE, ZIP _____ PHONE NO. _____

INSURANCE CO. _____ POLICY NO. _____

==========

COMPANY NAME _____

BUSINESS ADDRESS _____

TOWN, STATE, ZIP _____ PHONE NO. _____

INSURANCE CO. _____ POLICY NO. _____

==========

Failure to secure coverage as required under Section 25A of MGL 152 can lead to the imposition of criminal penalties of a fine up to $1,500.00 and /or one years' imprisonment as well as civil penalties in the form of a STOP WORK ORDER and a fine of $100.00 a day against me. I understand that a copy of this statement may be forwarded to the office of investigation of the DIA for coverage verification.

I do hereby certify under pains and penalties of perjury that the information provided above is true and correct.

SIGNATURE _____ DATE _____

PRINT NAME _____ PHONE NO. _____

DO NOT WRITE IN THIS SPACE, FOR OFFICE USE ONLY

_____

Fire Official: _____

DEC Staff: _____

==========

IDENTIFICATION OF APPLICANT

NAME _____

MAILING ADDRESS _____

TOWN, STATE, ZIP CODE _____

PHONE NUMBER AND AREA CODE _____

I hereby certify that the proposed work is authorized by the owner of recorded, and that I have been authorized by the owner to make this application as his / hers authorized agent. We agree to conform to all applicable Devens By-Laws, State Building Codes, and other restrictions / requirements from authorized agencies. I also certify that the information on this application is correct.

_____ _____

SIGNATURE OF APPLICANT DATE

LEVEL TWO UNIFIED PERMIT –
CHECKLIST FOR DETERMINATION OF COMPLETENESS
[Devens Enterprise Commission Rules and Regulations 2012]

Name of applicant and project: _____

Date of Issuance of this DOC: _____

List Regulatory Components of this Unified Permit: _____

Signature of LUA or Authorized Agent: _____

1. Submission Requirements

____ (a) A completed Permit application form.

____ (b) The required Administrative, Processing, and Peer Review Fee.

____ (c) One (1) original and Six (6) copies of the application, supporting plans and materials and one (1) digital copy of the full submission.

____ (d) A List of Abutters, certified if abutters are not located in Devens and a sketch plan showing the proximity of the abutters to the site.

____ (e) Drainage calculations prepared by an Engineer complying with 974 CMR 3.04(4).

____ (f) Request for Determination of Applicability (RFD) or a Notice of Intent (NOI) shall be submitted in accordance with Article XII of the By-Laws and 974 CMR 4.06 .

____ (g) Copies of all existing easements, covenants, restrictions and Institutional Controls applying to the lot.

____ (h) Soil suitability tests and analysis.

____ (i) A list of Waivers requested by the applicant, identified as Waivers of Submission and Plan Form and Contents requirements or Design Standards, with the applicable section of the Regulations clearly identified or a statement that no waivers are being requested.

____ (j) Copy of any variance applying to the land, granted or filed concurrently with the Site Plan.

____ (k) A narrative demonstrating compliance with the Reuse Plan and By-Laws meeting the specifications of 974 CMR 1.02.

___ (l) If proposed by the applicant, a plan for the phasing of the construction of the required improvements, including a description, schedule, and plan showing the location of each phase.

___ (m) A written statement of compliance with the Devens Open Space and Recreation Plan (DOSRP) and the Devens Main Post Trails report dated July 2001, to determine the effects, if any, of proposed development on resource areas, proposed trail rights-of-way, active and passive recreation areas, and other amenities included in the DOSRP.

___ (n) If an applicant proposes parking lot construction phasing, a written statement demonstrating that the portion to be constructed is sufficient for the needs of the users of the proposed structure, comparing the number of spaces required by the By-Laws to the number the applicant believes are adequate, written certification that no building or permanent accessory structure will be placed on the area reserved for additional parking spaces, and a draft covenant that the parking will be built when the DEC determines it is required.

___ (o) An estimate of the number of vehicle trips daily and for the morning and evening peak periods (trip generation rates shall be based on the ITE "Trip Generation Manual" most recent edition, and if applicable, data about similar developments in Massachusetts) and a description of traffic mitigation measures proposed including traffic management plans, trip reduction methods, and car/vanpooling preferential parking.

___ (p) An erosion and sedimentation plan.

___ (q) A landscaping maintenance and water management plan.

___ (r) A narrative demonstrating compliance with the Industrial Performance Standards.

___ (s) The Sustainable Sites section of the LEED Green Building Rating System Checklist.

___ (t) Building elevations or perspectives of those portions of the building visible from public ways and residential and open space zoning districts showing the general appearance, massing, building materials, proposed colors, and relationship to abutting premises and, prior to the public hearing, the design review letter from Mass Development.

2. Surveying and Drafting Plan Requirements

___ (a) Site plans shall be 24”x36” and at a scale of 1”= 40’ unless alternate size is approved by the Director. All Site Plans must also conform to the Registry of Deeds requirements for recording.

____ (b) The names and addresses of the record owner of the land and the applicant and the name, seal, and address of the designer, Engineer, Surveyor, and Registered Landscape Architect who made the plan, all of which shall appear in the lower right-hand corner.

____ (c) The name of the development, scale, date of plan, and legend.

___ (d) A locus plan indicating the general location of the site in relation to all adjacent and nearby roads, railroads, and waterways.

___ (e) Ties from the development site to the nearest town and county bounds if within 1000 feet of the site. Bearings and curve data/distances of all lot lines, names of all adjoining property owners as they appear in the most recent tax list, and the location of easements, rights-of-way, and public and private ways.

____ (f) Devens Lot number of the site, if available.

____ (g) Topography for the entire site in two-foot intervals with contours and principal elevations of significant existing and proposed features related to the National Geodetic Vertical Datum (NGVD) of 1929. Existing contours shall be shown as dashed lines and, along with all other existing features, shall be screened. Proposed contours are to be shown as solid lines.

___ (h) A space for the DEC's endorsement of the Site Plan by a majority of the members of the DEC on the front sheet and space for the chairperson or designee to sign all other sheets.

3. Administrative Plan Requirements

___ (a) Zoning district(s) and any boundary of zoning districts within the site, along any existing or proposed lot line, or within 50 feet.

___ (b) The location, dimensions (including height), and general use of all existing and proposed buildings and structures to remain, including ground coverage, gross floor area, open area uses, and other facilities and improvements. Location of buildings existing on the site to be developed and on adjacent land under the same ownership within 500 feet of the lot line, indicating whether existing buildings are to be retained, modified or removed.

___ (c) A statement noting the area of the site, the percentage of the site to be covered by impervious surfaces (such as buildings and parking areas), the area to be devoted to open space, the area to be paved for parking, driveways, loading spaces, and sidewalks, the number of proposed parking spaces and the number required by the By-Laws, the number of employees expected per shift, and the gross floor area of each proposed (commercial, industrial, office, or other) use. This data shall be tabulated to show the relationship of the required versus the proposed quantities

___ (d) Existing and proposed front, side, and rear setback dimensions.

____ (e) Parking lots and loading docks, showing driveway entrances and exits designed for safe ingress and egress, curb cuts, layout of parking spaces, aisles, off-street loading facilities, pedestrian walks, bicycle racks or storage facilities, handicap ramps, and representative cross-sections of service and parking areas and driveways.

____ (f) Existing and proposed landscape features such as fences, walls, planting areas, wooded areas, and walks. Scattered trees to be preserved shall also be shown as well as all "specimen trees" (trees exceeding a minimum caliper of twelve inches) within 100 feet of existing or proposed lot lines have been identified and indicated on the plan. All existing landscape features, especially existing trees

and woodland to remain are shown on ALL site plan sheets. Planting details setback, screens, and other landscaped areas including quantities, species, and spacing of plantings, shown at sufficient scale to illustrate clearly the landscaping design. Plans for walks, walls, and fences including dimensions, materials, and finishes. Landscaping Plans, Irrigation Design plans, Planting Plans, Planting Detail sheets, and Planting Specifications shall be prepared by a Landscape Architect registered in the Commonwealth of Massachusetts and shall bear the seal and signature of the Registered Landscape Architect who prepared them.

___ (g) Proposed means of fire equipment access**.**

___ (h) Proposed traffic circulation systems, including the volume and proposed direction of traffic flows into, out of, and within the site for both vehicles and pedestrians for an average day and for peak hours

___ (i) Location and dimensions (including height) of all storage facilities for equipment, material, and other like items. Location of all underground and aboveground fuel, combustible, and flammable liquid storage tanks greater than 250 gallons.

___ (j) Location and dimensions (including height) of facilities for garbage, rubbish, recycling, and other waste collection and disposal. Location and dimensions (including height) of facilities for garbage, rubbish, recycling, composting and other waste collection and disposal. **Note: Applicants should be aware of MA waste ban materials and plan for storage/reuse accordingly.** Info. on waste ban items can be found at http://goo.gl/Qrea5

___ (k) Garage and pedestrian entrances and exits.

___ (l) Maximum size vehicle, including trailers, expected to use the site after construction, by length, width, height, and American Association of State Highway and Transportation Officials (AASHTO) designation.

____ (m) Location and dimensions (including height) of existing and/or proposed free-standing signs and the manner of illumination. All proposed signs shall conform with Article XIII of the By-Laws and 974 CMR 6.00: Sign Control as most recently amended.

____ (n) Existing and proposed public and private utilities, above and below grade, along with their type, size, and class

___ (o) If the project is to be phased, a plan for the phasing of the construction of the required improvements, including a description, schedule, and plan of affected areas

___ (p) Any additional details that may be pertinent or required by the Director during the scoping or Pre-Permitting sessions

4. Industrial Performance Standards Plan Requirements.

___ (a) The site lighting information shall be provided on the Site Plan, including types of fixtures, heights, wattage, foot candle output directly under the light source, foot candle output at the lot line, and a photometric layout/diagram showing direction and intensity of outdoor lighting.

___ (b) Notes shall be provided on the Site Plan stating:
(1) Existing or proposed use will not generate electromagnetic interference to any sensitive receptor. Interference with the Harvard-Smithsonian radio telescope (1400-1720 MHz) is specifically prohibited.
(2) Proposed or existing use will not cause pronounced, multiple patterns of noise or vibration nuisance to, or interfere with, any sensitive receptor.
(3) Either "A Massachusetts Department of Environmental Protection (DEP) air quality permit application has been made" or "A DEP air quality permit is not required."

___ (c) Locations or uses deemed by the Director to be sensitive receptors in any given area of impact may be subject to field identification of the receptor and/or special documentation or field data that helps to clarify the existence or absence of subject impacts. This documentation and data includes existing secondary data and studies, limited field testing by the applicant, or in the worst case scenario, retention of additional professional consultants to conduct further testing. Specifications for any additional information will be identified by the Director during the pre-permitting conference and shall be incorporated in the Site Plan.

____ (d) A Copy of the completed Industrial Performance Standards Checklist shall be included: http://www.devensec.com/forms/Industrial_Performance_Standards_Checklist.pdf .

5. Wetlands/Water Resources/Flood Plain Plan Requirements.

___ (a) All existing natural features including ponds, brooks, wetlands, Federal Emergency Management Agency (FEMA) flood plain elevations on and/or adjacent to the lot, Flood Insurance Rate Map (FIRM) panel number, zone designation, and base flood elevation.

___ (b) Erosion, siltation, and dust control measures before and during construction, including appropriate ground cover, seeding, and street sweeping of adjacent public ways.

___ (c) Location of all private wells on or within 200 feet of the boundaries of the property, if any

___ (d) Location of all public and community water supply wells on or within 1,000 feet of the boundaries of the property, if any.

___ (e) Proposed conservation restrictions and easements.

6. Schedule:

Transmitted to BSC and other consultants
Pre-Permitting conference
Date of Determination of Completeness
Mail to Towns (30-day comment period begins)
Advertisements
Notification of abutters
Public hearing
End of 30-day comment period
Tentative vote

7. Notes/Comments

Devens Enterprise Commission
As-Built Record Drawings Policy

As per 974 CMR 3.03(4), the Devens Enterprise Commission (DEC) requires as-built plans be submitted to verify completed construction in accordance with the approved plans. To aid Applicants in meeting this requirement, the DEC has established an "As-Built" procedure. As-Built information shall be provided to the DEC, prior to the issuance of a final Certificate of Occupancy.

All As-Built information shall be obtained by a Professional Land Surveyor based on an on-the-ground survey and completed in accordance with the standards established in 250 CMR 6.00.

As-Built Record Drawings shall consist of:

1. Certification from a registered land surveyor, professional land surveyor, or professional engineer that all construction has been completed in accordance with the approved Development Plan; and
2. A stamped As-Built Plan (Record Drawing) showing the following information:
   - _ Project title/development name
   - _ Date of Plan, site address and parcel number
   - _ Owner's name, address, and telephone number
   - _ Developer's name, address, fax and telephone number
   - _ Date(s) of as-built survey
   - _ North arrow and Scale
   - _ Engineer's and Surveyor's names, address, fax and telephone number
   - _ Engineer's and Surveyor's Stamp and signature
   - _ Surveyors certification stating the following: I hereby certify that the information shown on this/these plan(s) accurately depicts field conditions based on an as-built survey by (*name of as-built surveyor*) performed on (*date of as-built survey*)
   - _ Engineer's certification stating the following: I hereby certify that the as-built information shown on this plan is in conformance with the approved site plans dated (date of latest approved site plan)
   - _ Plan survey datum shall reference Massachusetts State Plane (NAD 83) and National Geodetic Vertical Datum of 1929 (NGVD 1929). This reference shall be shown on the plans.
   - _ Zoning "required vs. actual" table showing zone, all as-built site, building, parking, impervious coverage, setbacks and landscaping requirements
   - _ Property line information-bearings, distances, bounds, etc…
   - _ Label building and provide building information (number of stories, square footage, proposed use, etc…)
   - _ Dimension building setbacks per zoning
   - _ First floor elevation/Sill elevations
   - _ Label all as-built improvements including but not limited to building footprint, curb, sidewalks, ramps, parking lot, retaining walls, fences, guard rail, lighting fixtures, signage, crosswalks, landscaping, etc…
   - _ Provide critical dimensions (lane widths, parking stall widths and depths (typical), curb radius, entrance width, width of sidewalk, etc…)
   - _ Provide driveway spot grades
   - _ Existing topography
   - _ 2' contours clearly labeled
   - _ Label critical slopes
   - _ The survey shall be tied into at least two points on the Devens Survey Control Network. Show location and coordinates of all control points used or set for the project.
   - _ Retaining wall elevations
   - _ Show all utilities including but not limited to water, sewer, drainage, gas, electric, telephone, hydrants, detention basins, etc…
   - _ Label all utility structures including but not limited to manholes, catch basins, gates, valves, shutoffs, detention basin inlet and outlet structures (including elevations of weirs/spillways and extent of rip rap and any other materials)
   - _ Rim elevations
   - _ Invert elevations
   - _ Bottom of sump elevations
   - _ Pipe type, length, diameter, slope
   - _ Show ties to all utility structures including but not limited to manholes, catch basins, gates, valves, shutoffs, etc…

Prior to the issuance of the occupancy permit, one (1) As-Built Plan will be provided to the DEC Director who will compare the As-Built Plans with the approved plans during a site inspection and note any discrepancies or changes. All deficiencies and errors noted by the Director shall be corrected prior to submittal of the final stamped As-Built plans.

Once the Director is satisfied that the project has been constructed according to the approved plan two (2) copies of the stamped As-Built Plan and As-Built Certificate will be provided to the DEC along with two (2) electronic copies in both AutoCAD and PDF format.

Devens Enterprise Commission
Reuse and Recycling Guidance for Devens Businesses and Residents

This guidance document was developed to assist Devens businesses and residents with meeting the recycling requirements of 974 CMR 8.00 and 310 CMR 19.017. This document also offers additional guidance on how businesses may be able further reduce waste generation with assistance provided by the Devens Eco-Efficiency Center and its Great Exchange reuse program.

Through MassDevelopment and the Devens Eco-Efficiency Center (DEEC), Devens currently offers recycling facilities for all waste ban materials listed by the MA Department of Environmental Protection. The recycling facilities are provided for all residents and small businesses on Devens.

In accordance with 974 CMR 8.00, all residents, businesses, industries and organizations in Devens are required to recycle all Waste Ban materials as defined by the MA Department of Environmental Protection in 310 CMR 19.017, which include:

- **Glass Containers:** glass bottles and jars (soda-lime glass) but excluding light bulbs, Pyrex cookware, plate glass, drinking glasses, windows, windshields and ceramics.
- **Metal Containers:** aluminum, steel or bi-metal beverage and food containers.
- **Single Polymer Plastics:** all plastic containers with recycle symbol.
- **Recyclable Paper:** all paper, cardboard, and paperboard products excluding tissue paper, toweling, paper plates and cups, wax-coated cardboard.
- **Yard Waste:** grass clippings, weeds, garden materials, shrub trimmings, and brush 1" or less in diameter (excluding diseased plants).
- **Leaves:** deciduous and coniferous leaf deposition.
- **Batteries:** lead-acid batteries used in motor vehicles or stationary applications.
- **White Goods:** appliances employing electricity, oil, natural gas or liquefied petroleum gas to preserve or cook food; wash or dry clothing, cooking or kitchen utensils or related items. These typically include refrigerators, freezers, dishwashers, clothes washers, clothes dryers, gas or electric ovens and ranges, and hot water heaters.
- **Whole Tires:** motor vehicle tires of all types. Whole tires may be disposed at combustion facilities. Shredded tires (a tire which has been cut, sliced or ground into four or more pieces such that the circular form of the tire has been eliminated) are not prohibited.
- **Cathode Ray Tubes:** any intact, broken, or processed glass tube used to provide the visual display in televisions, computer monitors and certain scientific instruments such as oscilloscopes.
- **Construction and Demolition Debris:** aggregate, asphalt, brick, carpet, ceiling tiles, concrete, gypsum, metal, paper, rubber, shingles and wood from construction activities and demolition of buildings and similar sources must be disposed of in a Massachusetts licensed construction and demolition debris recycling facility.

Every owner, tenant, occupant, property manager (acting on behalf of an owner, tenant, or occupant), or the person in control of the land at Devens is responsible for the proper disposal of recyclables, including the set up on site of recycling collection areas for owners, tenants, occupants, and property managers and for the proper disposal of recyclable materials and compostable yard waste. **Each occupant of land within Devens should therefore separate all designated recyclable materials and compostable yard waste from other refuse.**

Bundling of solid waste and recyclables service required: All haulers are required to provide bundled solid waste and recyclables collection services for their customers within Devens at a rate that reflects the cost of both services. Haulers are also required to provide quarterly reports to the Devens Department of Public Works (DPW) detailing the amounts and types of solid waste hauled and materials recycled. Exemptions are available provided the generator is using the Devens Recycling drop off or a separate hauler. **Generators (residents and businesses) shall send notice to the Devens DPW upon change of hauler.**

Recycling Services Available at Devens Department of Public Works (DPW)
Plastics, Bottles, Cans, Paper, Cardboard:Those who live or work in Devens can use the containers located in front of the DPW, located at 99 Buena Vista Street, to dispose of these recyclable materials. Containers are accessible at all times; paper and corrugated cardboard is to be disposed in the compactor.

Appliances, Metal Items
The DPW provides a drop-off location for refrigerators, washing machines, air conditioners, bicycles, filing cabinets, etc., for Devens residents at their facility. The DPW will also arrange to pick up these items curb-side. Both the drop-off and pick up services are available to Devens residents for a small fee and by appointment only. Call 978-772-1864 for additional information or to schedule a pick-up/drop-off.

Electronics
The DPW will also accept computer monitors, fax machines, printers, etc., from Devens residents and those who work in the community for a nominal disposal fee, by appointment only.

Compostable Yard Waste
The DPW currently provides free yard waste collection services **for residences only** within Devens. Every residential owner, tenant, occupant, or property manager (acting on behalf of an owner, tenant, or occupant) should place all compostable yard waste in suitable containers/bags and twigs/branches in tied bundles and place them at the curb at designated collection times as per the Devens Department of Public Works.

A detailed list of DPW accepted items, hours of operation and fees can be found at:
http://www.devenscommunity.com/sites/default/files/devens_recycling.pdf

Household Hazardous Waste Disposal:
In accordance with 310 CMR 30.000, all hazardous wastes must be disposed of at licensed disposal facilities. Households, organizations and business/industry within Devens that generate less than 220 pounds or 27 gallons on hazardous waste per month can use the service provided by the Devens Regional Household Hazardous Products Collection Center, located at 9 Cook Street. The Collection Center is open the first Wednesday and following Saturday of each month (March through December), 9:00a-noon. For more information and a list of acceptable materials, visit their website at http://www.devenshhw.com. For a listing of other current disposal permanent and temporary disposal centers in the region, go to:
http://www.northcentralmassrecycles.com/hazard.htm#form

Devens Eco-Efficiency Center Recycling-Reuse Services:
The Devens Eco-Efficiency Center is a non-profit entity based at 33 Andrews Parkway. The Center offers a number of programs and services that help establishments reduce waste generation and disposal costs. Technical assistance, outreach materials and 96-gallon recycle totes are available to help establish, strengthen or expand recycling programs in businesses and not-for-profit facilities.

Great Exchange:
The Center's Great Exchange program creates partnerships that divert a broad range of items and materials to reuse opportunities, including unwanted office furniture, outdated or imperfect inventory, packing materials, and production scraps. For additional information visit www.ecostardevens.com or call 978-772-8831 x3304.

Pallet Recycling Service:
Facilities located in Devens can have their wooden pallets collected free of charge on the morning of the first Thursday of each month. As more businesses participate, frequency may increase to every other week. The pallets will be refurbished for reuse, recycled as wood pellets or used as fuel at a local wood-fired power plant. Cardboard and stretch wrap can also be recycled through this service. For more information and to be included in the collections contact the Devens Eco-Efficiency Center at 978-772-8831 x3304 or donaneely@ecostardevens.com.

Private Recycling Services Available in Devens:
While the DEC does not endorse or promote any of the following private companies, the following recycling services are also situated within Devens:

Devens Recycling Center
Devens Recycling Center, located on Independence Drive, is a construction and demolition debris recycling facility.

For additional information or questions on recycling in Devens, please contact the Devens Enterprise Commission and the Devens Eco-Efficiency Center at: 978-772-8831 or visit their websites at
https://devensecoefficiencycenter.wordpress.com and www.devensec.com

APPENDIX H

Standard Operating Procedures

APPENDIX I

2016 MS4 Annual Reports