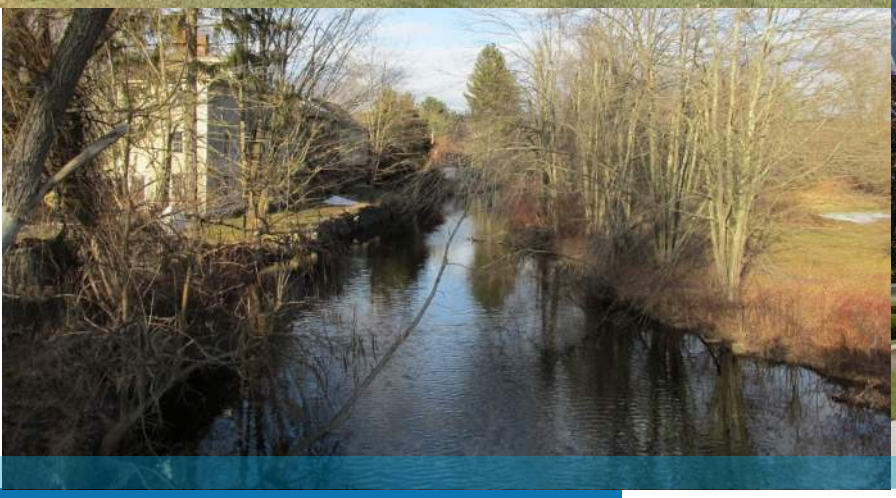








Town of Hampden, Massachusetts

STORMWATER MANAGEMENT PLAN

NPDES Permit # MA0410009

June 2019

Revision 1: June 2020
Revision 2: June 2021

Tighe&Bond
Engineers | Environmental Specialists

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Commonly Used Abbreviations	Definitions
BMP	Best Management Practice
CFR	Code of Federal Regulations
CMRSWC	Central Massachusetts Regional Stormwater Coalition
CWA	Clean Water Act
EPA	Environmental Protection Agency
GIS	Geographic Information System
IDDE	Illicit Discharge Detection and Elimination
MACRIS	Massachusetts Cultural Resource Information System
MassDEP	Massachusetts Department of Environmental Protection
MCM	Minimum Control Measure
MS4	Municipal Separate Storm Sewer System
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
POTW	Publicly Owned Treatment Works
PVPC CRSWC	Pioneer Valley Planning Commission Connecticut River Stormwater Coalition
SOP	Standard Operating Procedure
SSO	Sanitary Sewer Overflow
SWMP	Stormwater Management Program
TMDL	Total Maximum Daily Load
USFWS	U.S. Fish & Wildlife Service

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SECTION 1

Section 1
Introduction

The Town of Hampden is located in Hampden County in the Pioneer Valley region of southwestern Massachusetts. Hampden is a part of the City of Springfield Metropolitan Statistical Area, and is approximately 10 miles southeast of downtown Springfield. It is abutted by the Towns of East Longmeadow to the west, Monson to the east, and Wilbraham to the north, and the Towns of Stafford and Somer, Connecticut to the south.

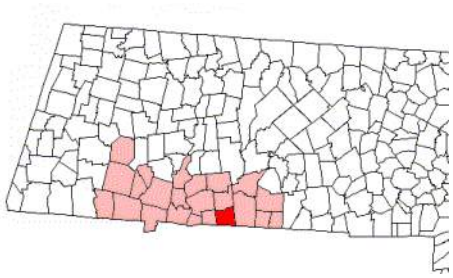


Figure 1.1 Location of Hampden, Hampden County, Massachusetts

Hampden is 19.6 square miles in size, of which 0.01 square miles is water, and is home to approximately 5,179 residents as of 2015.[1]

Protecting the quality of Hampden's water resources, including ponds, rivers, and groundwater supplies, is a priority for the Town. The Town has developed stormwater policy initiatives, provided education to its businesses and citizens, publicly discussed the issues related to stormwater runoff, and offered opportunities for residents and businesses to pitch in with clean-up efforts.

1.1 Purpose of this Plan

In an on-going effort to minimize stormwater impacts within Hampden, the Town has developed this Stormwater Management Plan (SWMP). The SWMP is required by the U.S. Environmental Protection Agency's (EPA's) National Pollutant Discharge Elimination System (NPDES) General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) in Massachusetts ("Small MS4 General Permit"). The SWMP describes and details the activities and measures that will be implemented by the Town to meet the terms and conditions of the permit.

The SWMP will be updated and/or modified during the permit term as the Town's activities are modified, changed, or updated to meet permit conditions. Other requirements of the 2016 Small MS4 General Permit, such as a Notice of Intent (NOI), Authorization to Discharge letter, and documentation showing Endangered Species Act and Historic Properties eligibility criteria have been certified and are located in the Appendices of this Plan.

1.2 Regulatory Requirements

1.2.1 Overview of EPA's NPDES MS4 Program

Through the NPDES program, the EPA nationally regulates the discharge of stormwater runoff that is transported into local water bodies via MS4s.

[1] http://www.pvpc.org/plans/town-hampden-open-space-and-recreation-plan-update

EPA's MS4 stormwater program was enacted in two phases:

- Phase I, issued in 1990, requires *medium* and *large* cities or certain counties with populations of 100,000 or more to obtain NPDES permit coverage for their stormwater discharges.
- Phase II, issued in 1999, requires regulated *small* MS4s in urbanized areas, as well as small MS4s outside the urbanized areas that are designated by the permitting authority, to obtain NPDES permit coverage for their stormwater discharges.

A **municipal separate storm sewer system (MS4)** is a conveyance or system of conveyances that is:

- owned by a state, city, town, village, or other public entity that discharges to waters of the U.S.,
- designed or used to collect or convey stormwater (e.g., storm drains, pipes, ditches),
- not a combined sewer, and
- not part of a sewage treatment plant, or publicly owned treatment works (POTW).

In Massachusetts, the EPA Region 1 and the Massachusetts Department of Environmental Protection (MassDEP) jointly administer the municipal stormwater program. EPA and MassDEP originally authorized Hampden to discharge stormwater in 2003 under a *NPDES General Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems*, known as the "2003 Small MS4 General Permit."

Under the 2003 Small MS4 General Permit, the Town has developed and implemented a Stormwater Management Program to reduce the contamination of stormwater runoff. The Small MS4 Program contains six "minimum control measures" (MCMs) that, when implemented, should result in a reduction in pollutants discharged into receiving waters:

1. Public Education and Outreach
2. Public Involvement and Participation
3. Illicit Discharge Detection and Elimination
4. Construction Site Stormwater Runoff Control
5. Post-Construction Stormwater Management
6. Good Housekeeping and Pollution Prevention

The 2003 Small MS4 General Permit expired in May 2008, but remained in full force and effect until the 2016 replacement permit became effective on July 1, 2018. The reissued NPDES *General Permit for Stormwater Discharges from Small MS4 in Massachusetts* substantially increases stormwater management requirements and mandates specific timelines for compliance.

This SWMP was developed to be consistent with the requirements of the 2016 Small MS4 General Permit for Massachusetts. Once implemented, the SWMP described herein will satisfy the requirements for compliance under the 2016 Small MS4 General Permit.

1.2.2 Hampden's Regulated Area

The Town of Hampden meets EPA's regulatory threshold for Phase II of the MS4 program, and therefore is required to be covered under a NPDES permit for its stormwater discharges from the MS4 in its Urbanized Area. The Town of Hampden is charged by the EPA with operating and maintaining its MS4 to manage stormwater runoff, as well as to protect public health and safety, preserve environmental resources, and safeguard town character.

Urbanized Areas (also known as "regulated areas") are defined by the latest U.S. decennial census. An urbanized area encompasses a densely settled territory that consists of core census block groups or blocks that have a population of at least 1,000 people per square mile and surrounding census blocks that have an overall density of at least 500 people per square mile or are included to link outlying densely settled territory with a densely settled urban core. [2]

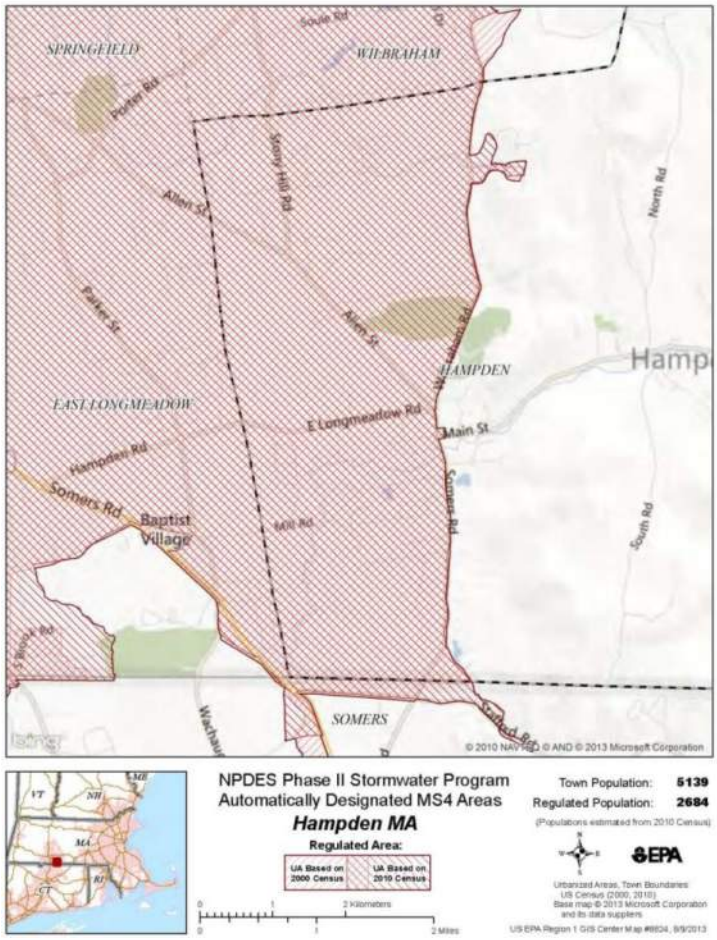


Figure 1.2. Hampden's Urbanized Area based on the 2000 and 2010 Census data.

According to EPA Region 1, the area covered by the 2000 census and the 2010 census are regulated by EPA under the MS4 program. The portion of Hampden considered to be urbanized area regulated under the MS4 program is primarily in the area west of Wilbraham Road/Somers Road, as illustrated by the hatching in Figure 1.2[3]. The remaining area of Town east of Wilbraham Road/Somers Road is not considered to be part of the MS4 regulated area.

[2] U.S. EPA. *Fact Sheet: Draft General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts.* September 2014. For a complete definition of Urbanized Area see Census Bureau; Urban Area Criteria for the 2010 Census, 76 Federal Register 53030 (August 24, 2011) https://www.federalregister.gov/documents/2011/08/24/2011-21647/urban-area-criteria-for-the-2010-census

[3] https://www3.epa.gov/region1/npdes/stormwater/ma/ram/hampden.pdf

1.3 Hampden's Stormwater Management Program under the 2003 Small MS4 General Permit

Hampden's stormwater management program is managed within the Highway Department. Currently, stormwater management tasks are carried out by various Town departments and volunteer boards, including the Board of Selectmen, Town Administrator, Planning Board, Board of Health, Conservation Commission, Building Department, and Stormwater Committee.

The Town of Hampden has achieved all of the measurable goals for the BMPs selected in the 2003 NOI and those added in subsequent years to reflect unplanned stormwater activities by the Town. The following paragraphs include brief descriptions of current practices the Town undertakes as part of its Stormwater Management Program.

1.3.1 MCM 1: Public Education and Outreach

The Town met the 2003 Small MS4 General Permit requirement of distributing educational material to the community early in the permit term through passive distribution of educational materials via educational displays in Town Hall and on the Town website. Additionally, a stormwater BMPs crossword puzzle has been previously distributed, and continues to be available in all Town Public Schools and Libraries, and water quality has been incorporated into the curriculum for grades 6, 7, and 8. The Town continues to utilize the Town webpage and passive distribution of brochures to disseminate information regarding stormwater pollution, management, and permitting, and maintains a large poster with information on the NPDES program and the construction industry in the Town Hall and Planning Board office.

The Stormwater Committee maintains a designated Stormwater webpage,[4] which includes information about and links to EPA's 2016 Small MS4 General Permit, and audience-specific stormwater information for homeowners, businesses, developers, and industry. The website also has links to educational information regarding proper methods for pet waste disposal, car maintenance and washing, and household waste disposal.

1.3.2 MCM 2: Public Involvement and Participation

The Town posts notices of public meetings and hearings on the Town website, which complies with State and Local public meeting notice requirements. The Town provides many opportunities for the public to participate in implementation of the stormwater management program. Residents of all ages can participate in pollution prevention, such as recycling, Adopt-a-Road program cleanup events, and proper disposal of household hazardous waste.

1.3.3 MCM 3: Illicit Discharge Detection and Elimination

The Town has developed and implemented an Illicit Discharge Detection and Elimination (IDDE) program in accordance with the requirements of the 2003 Small MS4 General Permit. The Town met the illicit discharge educational requirements through press releases and website article publication early in the permit term. All known stormwater outfalls are mapped in the Town's GIS, and new outfalls are added as they are constructed or identified.

[4] https://www.hampdenma.gov/stormwater-committee

The Town's *Stormwater Management Bylaw* (Chapter XIV of the General Bylaws of the Town of Hampden[5]), approved on April 25, 2005, prohibits illicit connections and unauthorized discharges to the MS4, defines prohibited non-stormwater discharges, and establishes the Town's authority to ensure compliance through inspection, monitoring, and enforcement. The Town continues to work on identifying failing septic systems and illicit discharges.

1.3.4 MCM 4: Construction Site Stormwater Runoff Control and MCM 5: Post-Construction Stormwater Management

The Town's *Erosion and Sediment Control for Stormwater Management Bylaw* (Chapter XIV(A) of the General Bylaws of the Town of Hampden), adopted on April 28, 2008, applies to activities that will result in disturbance of 40,000 square feet of land or will be part of a project that will disturb greater than 40,000 square feet of land, and requires proponents of such projects to prepare, submit, and follow a stormwater management and erosion control plan. The bylaw includes penalties for violations and inspection and long-term operation and maintenance requirements.

1.3.5 MCM 6: Pollution Prevention and Good Housekeeping

The Town of Hampden has developed and implemented a Good Housekeeping and Pollution Prevention Program in accordance with the requirements of the 2003 Small MS4 General Permit. All streets in the Urbanized Area are swept in the fall and the spring, with sweeping debris used for shoulder grading. The Town annually cleans 100% of catch basins in the Urbanized Area and 80% of total catch basins; screenings are used for daily cover, grading, or shaping at a landfill. A mix of sand and salt is used for winter road maintenance, with an estimated net reduction in sand application of 10-20% over permit year 15 of the 2003 Small MS4 General Permit. Training is held annually.

1.3.6 Additional Permit Requirements

1.3.6.1 Groundwater Recharge and Infiltration

Item C in section 6.1, Stormwater Management Performance Standards, Minimum Control Requirements of Chapter XIV (A) Erosion and Sediment Control of Stormwater Management of the Town's *Stormwater Management Bylaw* requires that loss of annual recharge to groundwater be minimized through the use of infiltration measures to the maximum extent practicable. Item A.1 of section 6.2, Stormwater Management Measures, ranks infiltration as the most preferred stormwater management measure, and item B. requires that infiltration practices be utilized to reduce increases in runoff volume. Additionally, per item F of Section 7.1, Design Requirements for Erosion and Sediment Control Plan, the erosion and sediment control plan should be designed to maximize groundwater recharge.

The Town of Hampden further protects groundwater resources through a Water Supply Protection Overlay District, as defined in section 6.11 of the Town's Zoning Bylaw[6]. Within the Water Supply Protection Overlay District, all uses must meet performance standards prohibiting or minimizing the use of leachable materials and, for commercial and industrial uses, maximizing recharge to the extent feasible.

[5] https://www.hampdenma.gov/sites/hampdenma/files/uploads/gbl_18-05-14_indexed.pdf

[6] https://www.hampdenma.gov/sites/hampdenma/files/uploads/zoning_bylaws_2016.pdf

1.3.6.2 Record Keeping

The Town maintains stormwater management program records and summarizes the actions taken by MCM in the annual report to EPA.

1.3.6.3 Discharges to Water Quality Impaired Waters and Total Maximum Daily Load (TMDL) Allocations

Per the Massachusetts Year 2014 Integrated List of Waters,[7] there are no water quality impaired waters identified within the Town of Hampden.

1.4 Summary of Requirements of EPA's 2016 Small MS4 General Permit

EPA released a draft of a "next generation" Massachusetts Small MS4 General Permit for public comment on September 30, 2014. Following the public comment period and public hearings (which ended February 29, 2015), EPA responded to comments and finalized and promulgated the permit. The final permit was issued on April 13, 2016 with an effective date of July 1, 2017. On June 29, 2017, the EPA administratively postponed the effective date of the permit for one year to July 1, 2018. MassDEP also adopted this delayed effective date.

The 2016 Small MS4 General Permit[8] is intended to be more prescriptive than the 2003 Small MS4 General Permit, and to build upon the regulations already in place. The new General Permit substantially increases stormwater management requirements and mandates specific timelines for compliance, as summarized below:

1. **Public Education and Outreach**: More specific messages required and prescriptive deadlines compared to the 2003 Small MS4 General Permit.
2. **Public Involvement and Participation**: Public notice of the SWMP and an annual public meeting to provide an opportunity for public comments are required.
3. **Illicit Discharge Detection and Elimination (IDDE) Program**: Interconnections are required to be added to the outfall inventory. Catchment areas need to be delineated and investigations prioritized. Dry weather screening and sampling of high priority and low priority MS4 interconnections and outfalls is required to be performed by the end of permit year 3. Wet weather screening is required to be performed in the spring for catchments with the presence of one or more System Vulnerability Factors. For impaired waters without TMDLs, a multi-step approach to address the discharges is required to be implemented, including Best Management Practices (BMPs), source identification, and an evaluation of retrofit feasibility.
4. **Construction Site Stormwater Runoff Control**: If they do not already exist, inspection and enforcement procedures are required to be added to the site plan review procedure.
5. **Stormwater Management in New Development and Redevelopment**: For new development, the first inch of runoff from all impervious surfaces on site is required to be retained on-site, or pollutant removal shall be provided via a BMP.

[7] https://www.mass.gov/files/documents/2016/08/sa/14list2_0.pdf

[8] https://www3.epa.gov/region1/npdes/stormwater/ma/2016fpd/final-2016-ma-sms4-gp.pdf

For redevelopment, the first 0.80 inches of runoff is required to be retained from all impervious surfaces on site or pollutant removal shall be provided via a BMP. Offsite mitigation may be used for redevelopment projects.

6. **Good Housekeeping and Pollution Prevention**: A program to repair and rehabilitate the MS4 infrastructure is required to be developed, and municipal streets are required to be swept/cleaned a minimum of once per year in the spring. All activities that occur at a municipal facility and potential pollutants associated with each activity are required to be included in the SWPPP for the facility.
7. **TMDLs**: The 2016 Small MS4 General Permit has increased requirements for public outreach, street sweeping, and pollution source identification and removal associated with TMDLs related to stormwater pollution relative to the 2003 Small MS4 General Permit.

According to Section 1.10.b of the 2016 Small MS4 General Permit, Hampden must modify or update the BMPs being implemented under the 2003 Small MS4 General Permit to meet the terms and conditions of part 2.3 of the 2016 Small MS4 General Permit. **Appendix B** includes a list of BMPs completed under the 2003 Small MS4 General Permit and BMPs included in the NOI and SWMP which comply with the 2016 Small MS4 General Permit. This list identifies how the intent of each 2003 BMP is being met under the 2016 BMPs.

1.5 Authorization for Hampden to Discharge Stormwater

A copy of the NOI submitted to EPA on September 28, 2018[9] for coverage under the 2016 Small MS4 General Permit is included in **Appendix A**. Documentation of the Town of Hampden's Authorization to Discharge issued by EPA on April 5, 2019[10] is also provided in **Appendix A**.

1.6 General Eligibility Determination

Section 1.2.1 of the 2016 Small MS4 General Permit authorizes the discharge of stormwater from small MS4s if the MS4 is determined to meet general eligibility criteria:

- *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 2010 Census or located in a geographic area designated by EPA as requiring a permit*

The Town of Hampden is located within Hampden County, Massachusetts. The population of the Town of Hampden was 5,139 according to the 2010 Census, the MS4 is not within a designated County, and the Town has not been designated by the Director as part of a large or medium MS4. As shown on Figure 1.2, based on 2000 and 2010 census listings, Hampden is partially located within an urbanized area.

[9] https://www3.epa.gov/region1/npdes/stormwater/ma/tms4noi/hampden.pdf

[10] https://www3.epa.gov/region1/npdes/stormwater/ma/tms4noi/hampden-auth.pdf

1.7 Special Eligibility Determinations

1.7.1 Endangered Species Act

On behalf of the Town of Hampden, Tighe & Bond completed the National Endangered Species Eligibility Determination screening process in accordance with Part 1.9.1 and Appendix C of the 2016 Small MS4 General Permit, and determined that the Town of Hampden meets Criterion C, where it has been determined that the Town's 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 US Fish and Wildlife Service (USFWS). Refer to **Appendix C** of the SWMP for supporting information, including the USFWS Official Species List for the project area and the Endangered Species Act Certification.

1.7.2 National Historic Preservation Act

On behalf of the Town of Hampden, Tighe & Bond completed the National Historic Preservation Act Eligibility Determination screening process in accordance with Part 1.9.2 and Appendix D of the 2016 Small MS4 General Permit, and determined that the Town of Hampden meets Criterion A, as the discharges do not have the potential to cause effects on historic properties.

Refer to **Appendix D** of the SWMP for supporting information, including a list of the federal- and state-listed historic areas, buildings, burial grounds, objects, and structures in the Town of Hampden's regulated area downloaded from the Massachusetts Cultural Resource Information System (MACRIS) and the National Register of Historic Places.

1.8 SWMP Program Implementation

As required by Section 1.10.2 of the 2016 Small MS4 General Permit, Table 1-1 below includes the names and titles of people responsible for program implementation, and shall be updated annually. If a position is unfilled, the title of the position shall be listed and the SWMP will be modified to include the name once the position is filled.

Table 1-1
Names and Titles of Persons Responsible for SWMP Implementation

Name	Title	Department	Contact Information	Role / Responsibilities
Mark Langone	Superintendent	Highway Department	(413) 566-8842	Manages the City's SWMP and compliance with the MS4 Permit. Oversees stormwater operations, including outfall screening, IDDE training, and the Good Housekeeping program
Andrew Netherwood	Chair	Stormwater Committee	andrew.netherwood@eversource.com	Assists with development and implementation of the Town's stormwater program

Table 1-1
Names and Titles of Persons Responsible for SWMP Implementation

Name	Title	Department	Contact Information	Role / Responsibilities
Donald Davenport	Chair	Board of Selectmen	(413) 566-2151 Ext. 100 selectmen@hampdenma.gov	Assists with public outreach and education, development of construction and post-construction regulations, site inspections, and enforcement, retrofit inventory, green infrastructure report, low impact design report
		Board of Health	(413) 566-2151 Ext. 102	Assists with IDDE program implementation, implementation of SWPPP at Transfer Station
Robert Markel	Town Administrator	Town Administrator	(413) 566-2151 Ext. 118 townadmin@hampdenma.gov	Assists with public outreach and education, development of construction and post-construction regulations, site inspections, and enforcement, retrofit inventory, green infrastructure report, low impact design report
John Matthews	Interim Chair (2021)	Planning Board	(413) 566-2151 Ext. 109	Assists with public outreach and education, development of construction and post-construction regulations, site inspections, and enforcement, retrofit inventory, green infrastructure report, low impact design report
Judy McKinley Brewer and Ted Zebert	Co-Chairs	Conservation Commission	(413) 566-2151 Ext. 110 Conservation@hampdenma.gov	Assists with implementation of site inspection procedures

Table 1-1
Names and Titles of Persons Responsible for SWMP Implementation

Name	Title	Department	Contact Information	Role / Responsibilities
Wendel Hulbert	Building Inspector	Building Department	(413) 566-2151 Ext. 107 inspector@hampdenma.gov	Assists with implementation and enforcement of site inspection procedures and issuance of stormwater permits

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SECTION 2

Section 2
Watershed Resources

2.1 Watershed Inventory

The Town of Hampden is located within the Connecticut River and Scantic River sub-watersheds within the Connecticut River watershed (Figure 2.1), which is a part of the Long Island Sound Drainage Basin (Figure 2.2).

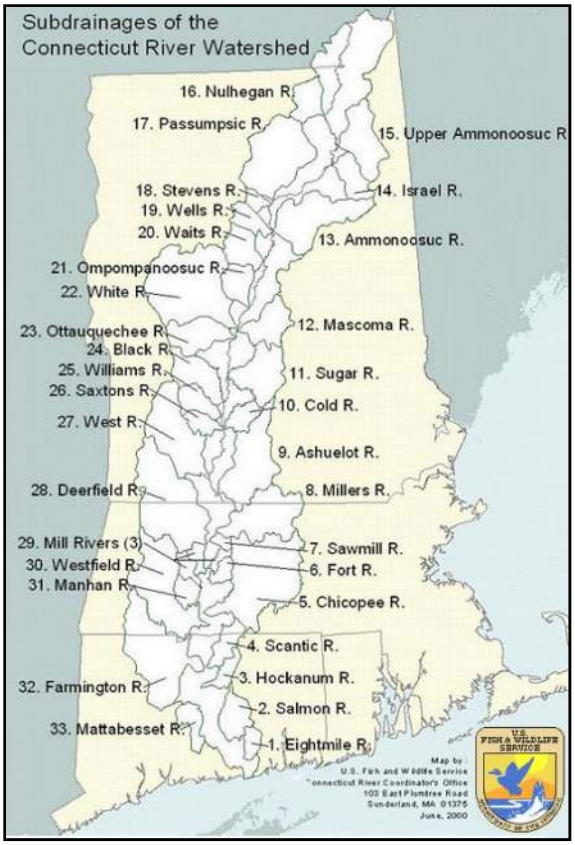


Figure 2.1. Subdrainage Basins of the CT River Watershed; the Scantic River subdrainage is labeled as number 4.

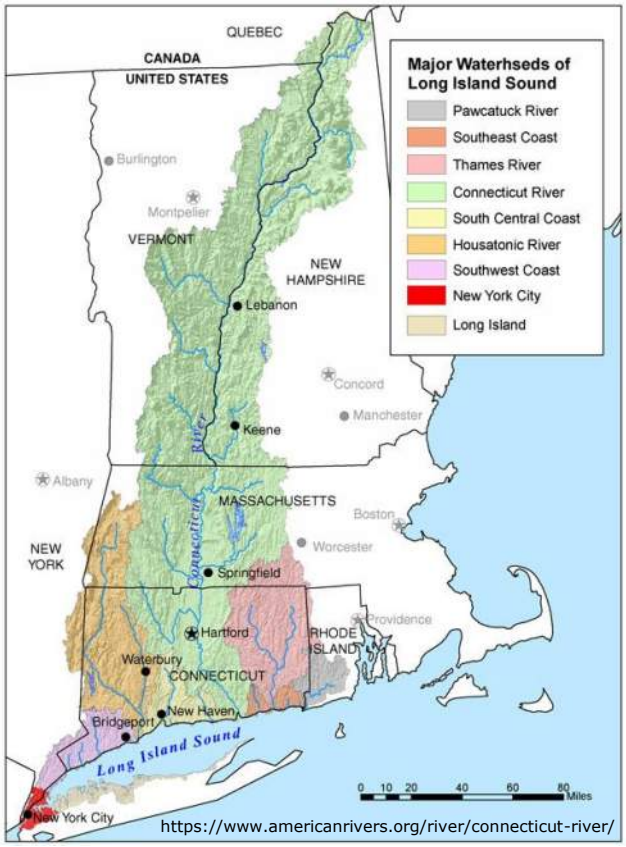


Figure 2.2. Major Watersheds of the Long Island Sound Drainage Basin; the Connecticut River is highlighted in green.

The Scantic River is the significant waterbody within the Town of Hampden, and traverses the Town from its southeastern corner northwest to the center of Town and then southwest to empty into the Connecticut River in East Windsor, Connecticut.

Other waterbodies in Town include the South Branch of the Mill River, which flows west from a pond on the northern border of Hampden into Springfield, several small mill ponds, and several streams/brooks (Laughing Brook, Big Brook, West Brook, East Brook, Temple Brook, Rockadundee Brook, Thrasher Brook, and Watchuag Brook).

Approximately 1% of the Town's total land area can be classified as wetland resource areas,[11] primarily located in the lowland (western) area of Town and in the upland area adjacent to streams and brooks.

Nearly all of the Town of Hampden's water is supplied by individual private on-site wells, with a nine residence public water supply near the Massachusetts Audubon's Laughing Brook Wildlife Sanctuary and public water supplies associated with Wingate, Hampden Housing Authority, and White Birch Garden Apartments. MassGIS identifies a medium yield aquifer in the western portion of Town, west of Wilbraham / Somers Road; uses in this area and the areas adjacent to waterbodies in Town are regulated under the Town's Zoning Bylaw as part of the Water Supply Protection Overlay District.

2.2 Receiving Waters

The following table lists all receiving waters and number of outfalls discharging to each waterbody segment. Receiving waters and outfalls are also shown on the map provided with the NOI in **Appendix A**. None of the receiving waters within Hampden are identified as having pollutants causing impairments per the Massachusetts Year 2014 Integrated List of Waters, as further discussed in Section 2.3.

Table 2-1
Summary of Receiving Waters and Number of Outfalls

Waterbody Segment that Receives Flow from the MS4	Number of Outfalls into Receiving Water Segment	Pollutant(s) Causing Impairments
South Branch Mill River	1	N/A
Wetland/Tributary to South Branch Mill River	14	N/A
Wetland/Tributary to Mill Pond	1	N/A
Wetland/Tributary to Sawmill Brook	1	N/A
Scantic River (MA34-30)	3	N/A – Category 2 Water (Attaining Some Uses, Other Uses Not Assessed)
Wetland/Tributary to Scantic River	11	N/A
Watchuag Brook	1	N/A
Wetland/Tributary to Watchuag Brook	7	N/A
Isolated Wetland off of Stony Hill Road	1	N/A
Isolated Wetland off of Genevieve Drive	1	N/A
Isolated Wetland off of Circle View Drive	1	N/A
Isolated Wetland off of Andrew Circle	2	N/A
Outside Receiving Water	24	N/A
Total	**68**	

[11] Town of Hampden Open Space and Recreation Plan 2017, https://www.hampdenma.gov/sites/hampdenma/files/uploads/hampden_osrp_update_2017_-final-070318.pdf.

Please refer to **Appendix F** for annual updates to the receiving waters, number of outfalls, and stormwater system mapping.

2.3 Water Quality

2.3.1 2014 Integrated List of Waters

To meet the requirements of the Clean Water Act (CWA), States must assess and categorize surface water bodies for attainment of designated uses (habitat for fish, fish and shellfish consumption, swimming, etc.). States must also identify any water bodies that are not expected to meet surface water quality standards after implementation of technology-based controls. These sources are prioritized for establishing TMDLs for use in permit setting.

Massachusetts meets the CWA reporting requirements through the creation of an Integrated Waters List in which waters are categorized as follows:

1: Unimpaired

2: Attaining some uses; others not assessed

3: No uses assessed

4a: TMDL completed

4b: Impairment controlled by alternative pollution control requirements

4c: Impairment not caused by pollutant (i.e., by non-native aquatic plants)

5: TMDL required

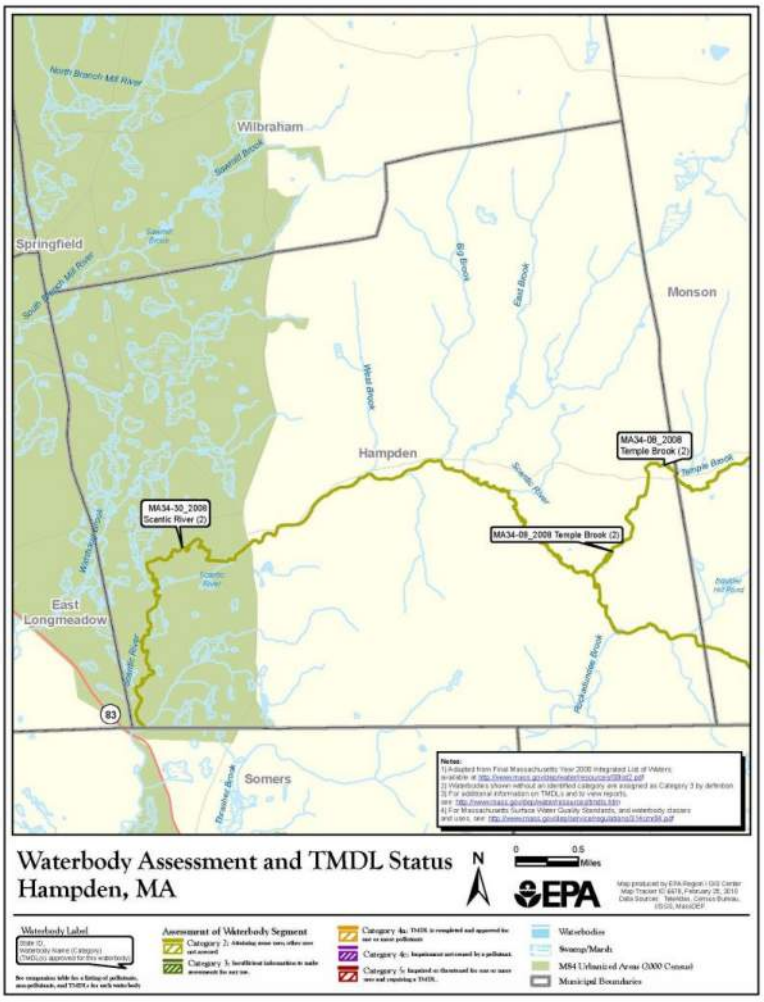


Figure 2.3. 2010 Waterbody Assessment and TMDL Status Map of Hampden.

As of the date of this SWMP, Massachusetts waters categorized as impaired surface waters were identified in the Final Massachusetts Year 2014 Integrated List of Waters. The 2014 Integrated List does not include any waterbodies located within the Town of Hampden as impaired. Figure 2.3, a waterbody assessment and TMDL status summary figure from 2010, also shows no impaired waterbodies located within Hampden.

2.3.2 Draft 2016 Integrated List of Waters

A draft 2016 Integrated List of Waters is available from MassDEP,[12] which has not been finalized as of the date of this SWMP, and is not yet the official EPA 303(d) list. The 2016 Integrated List proposes to revise the Scantic River (MA34-30) listing to Category 5: TMDL required, for an *E. coli* impairment.

As of June 2021, the Massachusetts Year 2016 Integrated List of Waters has been finalized,[13] and a draft Massachusetts Year 2018/2020 Integrated List of Waters[14] has been made available for public review. Both the final Year 2016 Integrated List and the draft 2018/2020 Integrated List include the MA34-30 segment of the Scantic River as a Category 5: TMDL required water impaired by *E. coli*.

Please refer to **Appendix F** for annual updates to the receiving waters as necessary based on changes to the integrated lists of waters as they are finalized.

2.3.3 Applicable TMDLs

The Connecticut River watershed contributes to the Long Island Sound. Although none of the receiving waterbodies in Hampden are impaired for nitrogen according to the Massachusetts Integrated List of Waters, the Town of Hampden is required by EPA to incorporate additional MCMs and BMPs to address the Final TMDL for Nitrogen in the Long Island Sound.

[12] MassDEP, Bureau of Water Resources, "Draft Massachusetts Year 2016 Integrated List of Waters". June 2017. Accessed online at: https://www.mass.gov/files/documents/2017/08/zu/16ilwplist.pdf

[13] MassDEP, Bureau of Water Resources, "Massachusetts Year 2016 Integrated List of Waters". December 2019. Accessed online at: https://www.mass.gov/doc/final-massachusetts-year-2016-integrated-list-of-waters/download

[14] MassDEP, Bureau of Water Resources, "Massachusetts Integrated List of Waters for the Clean Water Act 2018/2020 Reporting Cycle – Draft for Public Comment". April 2021. https://www.mass.gov/doc/draft-massachusetts-integrated-list-of-waters-for-the-clean-water-act-20182020-reporting-cycle/download

Tighe&Bond

SECTION 3

Section 3
BMPs to Address 2016 Small MS4 General Permit MCMs

3.1 MCM 1: 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.*

This section of the SWMP describes how to comply with the Public Education and Outreach requirements in General Permit Section 2.3.2.

3.1.1 MCM 1 BMPs from NOI

BMP ID	BMP Media/ Category	BMP Description	Targeted Audience	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
1A	Multi-media (print and web materials)	Distribute an annual message in the spring (Apr/May) that encourages proper use and disposal of grass clippings and encourages use of slow-release fertilizers Distribute an annual message in the summer (Jun/Jul) that encourages proper management of pet waste Distribute an annual message in the fall (Aug/Sept/Oct) that encourages proper disposal of leaf litter	Residents	PVPC CRSWC, Highway Dept., Board of Selectmen, Town Clerk, Stormwater Committee	Distribute a minimum of three (3) timed messages annually on specific Nitrogen TMDL related topics	2018

BMP ID	BMP Media/ Category	BMP Description	Targeted Audience	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
1B	Multi-media (print and web materials)	Distribute an annual message in the spring (Apr/May) that encourages proper use and disposal of grass clippings and encourages use of slow-release fertilizers Distribute an annual message in the summer (Jun/Jul) that encourages proper management of pet waste Distribute an annual message in the fall (Aug/Sept/Oct) that encourages proper disposal of leaf litter	Businesses, Institutions, and Commercial Facilities	PVPC CRSWC, Highway Dept., Board of Selectmen, Town Clerk, Stormwater Committee	Distribute a minimum of three (3) timed messages annually on specific Nitrogen TMDL related topics	2019
1C	Multi-media (print and web materials)	Education and outreach on stormwater management topics of significance in Hampden (including proper erosion and sedimentation control, permit requirements, and design standards). Educational topics will include but are not limited to those in Part 2.3.2.d.iii	Developers (Construction)	PVPC CRSWC, Highway Dept., Board of Selectmen, Planning Board, Conservation Commission, Building Inspector, Stormwater Committee	Distribute a minimum of two (2) educational messages spaced at least a year apart	2018
1D	Multi-media (print and web materials)	Education and outreach on stormwater management topics of significance in Hampden (including pollution prevention, illicit discharges, information about the Multi-Sector General Permit). Educational topics will include but are not limited to those in Part 2.3.2.d.iv	Industrial Facilities	PVPC CRSWC, Highway Dept., Board of Selectmen, Town Administrator, Planning Board, Building Inspector, Stormwater Committee	Distribute a minimum of two (2) educational messages spaced at least a year apart	2019

3.1.2 MCM 1 Implementation Plan

BMP 1A Education and Outreach to Residents

Education and outreach goals for BMP 1A include:

- Increasing awareness of the impact of human activities on stormwater runoff and water quality
- Changing residential behavior over time
- Reaching broad audiences with information that appeals to a diverse public
- Meeting the education and outreach requirements of the 2016 Small MS4 General Permit Appendix F part B.I., Nitrogen TMDL requirements associated with the Long Island Sound TMDL

The Town of Hampden will distribute annual timed messages in accordance with the requirements of 2016 Small MS4 General Permit Appendix F part B.I. as follows:

- Annual spring message (April/May) encouraging proper use and disposal of grass clippings and encourages use of slow-release fertilizers
- Annual summer message (June/July) encouraging proper pet waste management
- Annual fall message (August/September/October) encouraging proper disposal of leaf litter

The Town will build upon the existing public education and outreach program to disseminate educational materials to residents via the internet, email, direct mailing, local cable channel, and/or public posting. The Town will coordinate public educational strategies with the Pioneer Valley Planning Commission's Connecticut River Stormwater Committee (PVPC CRSWC) and take advantage of existing materials wherever possible. Section 3.1.5 includes free resources the Town can take advantage of to supplement the program, including educational documents targeted towards residents.

BMP 1B Education and Outreach to Businesses, Institutions, and Commercial Facilities

Education and outreach goals for BMP 1B include:

- Increasing awareness of business practices that may contribute to stormwater pollution
- Changing behavior over time
- Improving compliance with local code
- Meeting the education and outreach requirements of 2016 Small MS4 General Permit Appendix F part B.I., Nitrogen TMDL requirements associated with the Long Island Sound TMDL

The Town of Hampden will distribute annual timed messages in accordance with the requirements of 2016 Small MS4 General Permit Appendix F part B.I. as follows:

- Annual spring message (April/May) encouraging proper use and disposal of grass clippings and encourages use of slow-release fertilizers
- Annual summer message (June/July) encouraging proper pet waste management
- Annual fall message (August/September/October) encouraging proper disposal of leaf litter

The Town will build upon the existing public education and outreach program to disseminate educational materials to businesses, institutions, and commercial facilities within Town via the internet, direct mailing, and/or posting of print materials at public buildings. The Town will coordinate public educational strategies with PVPC CRSWC and take advantage of existing materials wherever possible. Section 3.1.5 includes free resources the Town can take advantage of to supplement the program, including educational documents targeted towards businesses, institutions, and commercial facilities.

BMP 1C Education and Outreach to Developers

Education and outreach goals for BMP 1C include:

- Increasing awareness of the impact of construction activities on stormwater runoff and water quality
- Changing developer behavior over time
- Improving compliance with local code

Hampden will provide educational materials and general outreach to developers for stormwater management topics relevant to Hampden. Topics may include:

- Proper sediment and erosion control management practices
- Information about Low Impact Development (LID) principles and technologies
- Information about EPA's construction general permit (CGP)

The Town will build upon the existing public education and outreach program to disseminate educational materials to developers via the internet and/or attaching educational materials to permit applications. The Town will coordinate public educational strategies with PVPC CRSWC and take advantage of existing materials wherever possible. Section 3.1.5 includes free resources the Town can take advantage of to supplement the program, including educational documents targeted towards developers.

BMP 1D Education and Outreach to Industrial Facilities

Education and outreach goals for BMP 1D include:

- Increasing awareness of industrial activities that may contribute to stormwater pollution
- Changing behavior over time
- Improving compliance with local code

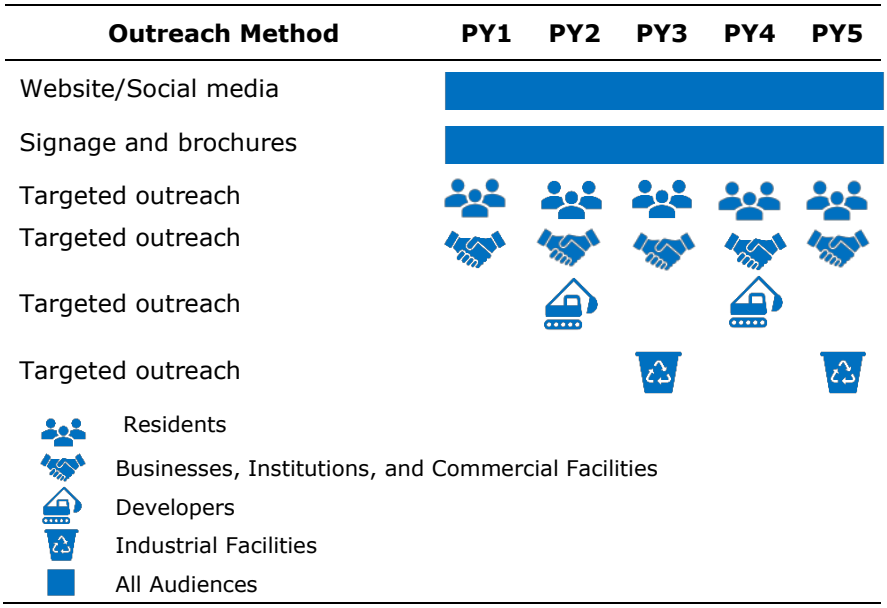
Hampden will provide educational materials and general outreach to industrial facilities within Town for stormwater management topics relevant to Hampden. Topics may include:

- 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 groundwater 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)
- Requirements for coverage under EPA's Multi-Sector General Permit (MSGP)

The Town will build upon the existing public education and outreach program to disseminate educational materials to industrial facilities within Town via the internet and/or direct mailing. The Town will coordinate public educational strategies with PVPC CRSWC and take advantage of existing materials wherever possible. Section 3.1.5 includes free resources the Town can take advantage of to supplement the program, including educational documents targeted towards industrial facilities.

3.1.3 MCM 1 Implementation Schedule



3.1.4 Public Education and Outreach Goals and Progress

Per Section 2.3.2.e of the 2016 Small MS4 General Permit, the public education and outreach program shall provide focused messages for specific audiences and show evidence that progress toward the goals of the program have been achieved. The following methods may be used by the Town to evaluate the effectiveness of the educational messages and overall education program:

- Quantify the number of each audience that is reached during direct mailings
- Track changes in behavior for specific issues addressed with education throughout the permit term (e.g., issues with erosion/sediment control during construction, pet waste bags found in catch basins, etc.)

The above methods used to evaluate the effectiveness of the program, and any additional methods developed after the date of this SWMP, shall be tied to the defined goals of the program and the overall objective of changes in behavior and knowledge.

3.1.5 MCM 1 Guidelines and Resources

The following links include free or low-cost resources Hampden can use to supplement the Public Education program.

EPA Public Education
https://cfpub.epa.gov/npstbx/

EPA Stormwater Management Program Resources – Public Education
https://www.epa.gov/npdes-permits/stormwater-tools-new-england#peo

EPA Stormwater Education Toolkit (SET)
http://www.stormwater.ucf.edu/toolkit/

EPA National Menu of BMPs for Stormwater
https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#edu

MassDEP Public Education
https://www.mass.gov/guides/stormwater-outreach-materials-to-help-towns-comply-with-the-ms4-permit

Developing an Effective Stormwater Education and Outreach Program for Your Community
http://www.urbanwaterslearningnetwork.org/wp-content/uploads/2016/04/Manual-Stormwater-Education-and-Outreach_2014.pdf

EPA - *Evaluation of the Role of Public Outreach and Stakeholder Engagement in Stormwater Funding Decisions in New England: Lessons from Communities*
https://www.epa.gov/sites/production/files/2015-09/documents/eval-sw-fundingnew-england.pdf

Urban Waters
http://www.nmstormwater.org/for-municipalities

Think Blue Massachusetts: Residents, Businesses, Developers, Industrial Facilities, and MS4 Communities
https://www.thinkbluemassachusetts.org/

3.1.6 MCM 1 Checklist of Key Documentation

Documentation of BMP progress should be kept in Appendix F. The following checklist includes the required documentation for MCM 1. See Section 5 of this Plan for additional record keeping information.

- ☐ All educational materials provided to target audiences
- ☐ Distribution lists for target audiences
- ☐ Dates of distribution of educational materials
- ☐ Annually track changes in social media subscription and use
- ☐ Note educational goals and opinion on effectiveness based on results tracked; modify education and outreach program if necessary

3.2 MCM 2: Public Involvement and Participation

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

This section of the SWMP describes how to comply with the Public Involvement and Participation requirements in General Permit Section 2.3.3.

3.2.1 MCM 2 BMPs from NOI

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
2A	Public Review	SWMP available for public review at Highway Department office	Highway Department	Allow annual review of stormwater management plan and posting of stormwater management plan on website	2019
2B	Public Participation	Provide public participation opportunities	All Town Departments, Boards, and Committees	Allow public to comment on stormwater management plan annually	2019

3.2.2 MCM 2 Implementation Plan

BMP 2A Stormwater Management Plan Public Review

Hampden shall provide the public with an opportunity to review this Stormwater Management Plan prior to finalizing it, and with other opportunities to participate in the Town's Stormwater Program on an annual basis.

While the Highway Department is the responsible party for this BMP, multiple Town Departments can help aid in successful implementation, as public participation in stormwater management initiatives often crosses Departments.

This SWMP was presented at a public meeting on June 20, 2019 to solicit input from the general public. Additionally, the SWMP is available to the public for review and comment at the Highway Department office.

BMP 2B Public Participation in Stormwater Management Program

Public involvement and participation goals for BMP 2B include:

- Increasing public involvement in and knowledge of Hampden's stormwater program
- Improving water quality through local clean up and waste collection events

Hampden shall continue to provide notice for public meetings per Massachusetts General Law requirements, including meetings pertaining to the Stormwater Management Program.

The Town shall continue to provide annual opportunities for public participation in the Program. These opportunities may include, but are not limited to:

- Stormwater-related events with school groups
- Stormwater Committee
- Adopt-a-Road program

Appendix E includes a document with helpful tips for organizing and conducting volunteer clean-up events that Hampden may reference. The Town shall document all public participation activities in the Annual Reports, and documentation should seek to quantify results or impact to better evaluate the public involvement and participation program effectiveness.

3.2.3 MCM 2 Implementation Schedule

BMP	PY1	PY2	PY3	PY4	PY5
2A Stormwater Management Plan Public Review	●	●	●	●	●
2B Public Participation in Stormwater Management Program	⟷				

● = annual requirement

⟷ = ongoing requirement

3.2.4 MCM 2 Guidelines and Resources

The following links include free or low-cost resources Hampden can use to supplement the Public Involvement program.

EPA National Menu of BMPs for Stormwater
https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#inv

EPA Evaluation of the Role of Public Outreach and Stakeholder Engagement in Stormwater Funding Decisions in New England
https://www.epa.gov/sites/production/files/2015-09/documents/eval-sw-funding-new-england.pdf

Manchester Urban Ponds Restoration Program - *Tips for Organizing and Conducting Volunteer Clean-up Events*
Available in Appendix E of this SWMP

Massachusetts Open Meeting Law Guide
http://www.mass.gov/ago/docs/government/oml/oml-guide.pdf

3.2.5 MCM 2 Checklist of Key Documentation

Documentation of BMP progress should be kept in Appendix F. The following checklist includes the required documentation for MCM 2. See Section 5 of this Plan for additional record keeping information.

- ☐ Public meeting dates and topics when stormwater management is discussed
- ☐ Dates of public participation activities and quantification of participation (such as number of volunteers/participants, number of bags collected, etc.)

3.3 MCM 3: 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.*

This section of the SWMP describes how to comply with the Illicit Discharge Detection and Elimination Program requirements in General Permit Section 2.3.4.

3.3.1 MCM 3 BMPs from NOI

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
3A	Inventory of All Identified Sanitary Sewer Overflows (SSOs) within Previous 5 Years	No SSO inventory is needed at this time as the Town is not sewered. If sewer service is added, develop SSO inventory in accordance with permit conditions	Not applicable	Not applicable at this time	Not applicable
3B	Storm sewer system map	Outfall Inventory Complete. Improve map as new data is collected. Add data to GIS map as required by Section 2.3.4.5, including interconnections with other MS4 systems, waterbody use impairments, and catchment delineations.	Highway Department	Update map within 2 years of effective date of permit and complete full system map 10 years after effective date of permit	2018
3C	IDDE By-Law	Complete. Continue to enforce and update as necessary	Highway Department	Review current procedures and modify if necessary within 1 year of permit effective date	2018
3D	Written IDDE program	Develop written IDDE program	Highway Department	Complete written IDDE program within 1 year of the effective date of permit, update components annually as needed	2018

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
3E	Dry Weather Outfall and Interconnection Screening and Sampling	Perform dry weather outfall, interconnection screening and sampling as needed in accordance with outfall screening procedure and permit conditions	Highway Department	Complete 3 years after effective date of permit. Track number of illicit discharges identified and volume removed. Summarize sampling results	2018
3F	Catchment Investigations and Wet Weather Screening and Sampling	Develop investigation procedures and priority ranking of catchments based on System Vulnerability Factors and evaluate catchments according to ranking, IDDE Program, and permit conditions	Highway Department	Complete 10 years after effective date of permit. Track number and percentage of MS4 catchments evaluated. Track number of illicit discharges identified and volume removed. Summarize screening / sampling results	2019
3G	Ongoing Screening	Reprioritize each outfall or interconnection, schedule ongoing dry and wet weather screening	Highway Department	Complete ongoing outfall screening upon completion of IDDE Program	2018
3H	Employee training	Provide internal training to employees involved in IDDE program and utilize PVPC CRSWC training	Highway Department, PVPC CRSWC	Train annually, report on the frequency and type of employee training in each annual report	2018

3.3.2 MCM 3 Implementation Plan

A written IDDE Plan has been developed for the Town of Hampden, and is provided in **Appendix H**. Refer to this Plan for the complete IDDE program and requirements of MCM 3. This section presents a summary of the information presented in the IDDE Plan.

BMP 3A SSO Inventory

The Town must identify all known locations where sanitary sewer overflows (SSOs) have discharged to the municipal drainage system within the past five (5) years and create an inventory in accordance with the requirements of section 2.3.4.4 of the 2017 Small MS4 General Permit that includes the following information:

- Location (approximate street crossing/address and receiving water, if any)
- Date(s) and time(s) of each known SSO occurrence
- Estimated volume(s) of each known SSO occurrence
- Description of the occurrence indicating known or suspected cause(s)

- Mitigation and corrective measures completed, with dates implemented
- Mitigation and correction measures planned, with implementation schedules

This BMP is currently not applicable, as the Town of Hampden is not sewered. Should sewer service be added, an SSO inventory would be developed in accordance with permit conditions. See Section 2 of the IDDE Plan for additional information.

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

The MassDEP contacts are:	The EPA contacts are:
Western Region (413) 784-1100 436 Dwight Street Springfield, MA 01103 24-hr Emergency Line: (888) 304-1133	EPA New England (617) 918-1510 5 Post Office Square Boston, MA 02109

BMP 3B Storm Sewer System Map

A comprehensive map of Hampden's drainage system has been developed, and the Town has met a large portion of the requirements of this BMP. Town staff should continue to update the map as necessary to reflect new infrastructure, newly discovered information, corrections or modifications, improved connectivity, and progress made. See Section 3 of the IDDE Plan for additional information.

BMP 3C IDDE Bylaw

The IDDE program shall include adequate legal authority to prohibit, investigate, and eliminate illicit discharges and implement enforcement procedures and actions. Hampden has met this requirement by adopting *Stormwater Management* (Chapter XIV of the Town's Bylaws) in April of 2005. This bylaw prohibits illicit discharges to the Town's drainage system. The Board of Selectmen, its employees or its designated agents serve as the authorized enforcement agency for the bylaw. See Section 4 of the IDDE Plan for additional information.

BMP 3D Written IDDE Program

Hampden has implemented a town-wide IDDE Plan, finalized in 2019, which includes procedures and timelines developed in accordance with the 2016 Small MS4 General Permit. The Town should continue to update and modify the Plan on an as-needed basis.

The IDDE Plan will include outfall screening on High and Low Priority Outfalls within 3 years of the permit's effective date, catchment investigations for 100% of the Problem Outfalls within 7 years of the permit's effective date, and 100% of all catchment investigations within 10 years of the permit's effective date. The outfall/interconnection inventory and initial ranking and the dry weather outfall and interconnection screening and sampling results will be included in the IDDE Plan. See the IDDE Plan in Appendix H for additional information.

BMP 3E Dry Weather Outfall/Interconnection Screening and Sampling

Dry weather outfall screening and sampling methods are described in Section 7 of the IDDE Plan included in Appendix H.

Field investigations must be completed during dry weather conditions to confirm whether any Low or High Priority outfalls have dry weather flow, which may be indicative of illicit connections/discharges. The initial catchment delineation and priority ranking must be updated by the end of Permit Year 3 based on the data gathered in the field.

All data gathered during implementation of this BMP must be reported annually, including the number of illicit discharges identified, corrective measures planned and implemented, estimated volume removed, and a summary of screening and sampling results. See Section 7.1 of the IDDE Plan for additional information.

BMP 3F Catchment Investigations and Wet Weather Screening and Sampling

Catchment investigation procedures are described in Section 7 of the IDDE Plan included in **Appendix H**. Each catchment associated with an outfall or interconnection within the MS4 must be investigated based on identified System Vulnerability Factors (SVF, i.e., the likelihood that illicit discharges/connections exist) in that particular area.

For all catchments, key junction manholes shall be opened and inspected for evidence of illicit connections during dry weather conditions. For catchments with one or more SVF, wet weather monitoring must be completed. The Town will identify the number of outfall catchments in the MS4 that have been evaluated using the catchment investigation procedure developed under BMP 3D.

All data gathered during implementation of this BMP must be reported annually, including number and percentage of MS4 catchments evaluated, number of illicit discharges identified, corrective measures planned and implemented, estimated volume removed, and a summary of screening/sampling results. See Section 7.2 of the IDDE Plan for additional information.

BMP 3G Ongoing Screening

At the conclusion of field work for BMPs 3E and 3F, the outfall/interconnection inventory should be updated and reprioritized for ongoing screening once every five years. Ongoing dry and wet weather screening will continue after completion of the written IDDE program. See Section 8.3 of the IDDE Plan for additional information.

BMP 3H Employee Training

Employees involved in the IDDE Program must be trained annually on the Program, including how to recognize illicit discharges and SSOs in accordance with the IDDE Plan. Training occurs annually in the Spring. See Section 9.2 of the IDDE Plan for additional information.

3.3.3 MCM 3 Implementation Schedule

EPA's implementation timeline for the IDDE Program is available in Appendix E.

BMP	PY1	PY2	PY3	PY4	PY5
3A SSO Inventory			N/A		
3B Storm Sewer System Map	⟷	⟷	⟷	⟷	⟷
3C IDDE By-Law	✓				
3D Written IDDE Program	✓				
3E Dry Weather Outfall/Interconnections Screening and Sampling	⟷	⟷			
3F Catchment Investigations and Wet Weather Screening and Sampling		⟷	⟷	⟷	⟷
3G Ongoing Screening	⟷	⟷	⟷	⟷	⟷
3H Employee Training	●	●	●	●	●

✓ = BMP complete

● = annual requirement or year due

⟷ = ongoing requirement

3.3.4 MCM 3 Guidelines and Resources

The following links include free or low-cost resources Hampden can use to supplement the IDDE program. The Town-specific procedures in the IDDE Plan were developed using the IDDE Guidance Manual and New England Source Tracking Protocol linked below. A link to the Town's *Stormwater Management Bylaw* is also provided below.

Center for Watershed Protection - *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*
https://www3.epa.gov/npdes/pubs/idde_manualwithappendices.pdf

EPA Stormwater Management Program Resources – IDDE
https://www.epa.gov/npdes-permits/stormwater-tools-new-england#idde

EPA New England - *Bacterial Source Tracking Protocol*
https://www3.epa.gov/region1/npdes/stormwater/ma/2014AppendixI.pdf

EPA National Menu of BMPs for Stormwater
https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#ill

Hampden General Bylaws (Chapter XIV: Stormwater Management)
https://www.hampdenma.gov/sites/hampdenma/files/uploads/gbl_16-04-25_indexed.pdf

3.3.5 MCM 3 Checklist of Key Documentation

Documentation of BMP progress should be kept in **Appendix F**. The following checklist includes the required documentation for MCM 3. More information about IDDE reporting is located in Section 10 of the IDDE Plan. See Section 5 of this Plan for additional record keeping information.

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

3.4 MCM 4: Construction Site Stormwater Runoff Control

Objective: *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.*

This section of the SWMP describes how to comply with the Construction Site Stormwater Runoff Control requirements in General Permit Section 2.3.5.

3.4.1 MCM 4 BMPs from NOI

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
4A	Site Inspection and Enforcement of Erosion and Sediment Control (ESC) measures	Continue to implement and enforce the existing site inspection procedures within the Erosion and Sediment Control Bylaw (Chapter XIV (A) of the General Bylaws)	Planning Board, Board of Selectmen, Highway Department, Building Inspector	Review current procedures and modify if necessary within 1 year of permit effective date	2018

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
4B	Site Plan Review	Modify the existing bylaw to include evaluation of opportunities for use of low impact design and green infrastructure	Planning Board, Board of Selectmen, Highway Department, Town Counsel	Complete modifications within 1 year of permit effective date. Include tracking information regarding the number of site reviews, inspections, and enforcement actions in the annual report	2018
4C	Erosion and Sediment Control	Continue to implement and enforce the existing Erosion and Sediment Control Bylaw requirements for construction site operators to implement an ESC program	Planning Board, Board of Selectmen, Highway Department, Town Counsel, Building Inspector	Review current procedures and modify if necessary within 1 year of the effective date of permit	2018
4D	Waste Control	Incorporate requirements to control wastes into the existing bylaw, including but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes	Planning Board, Board of Selectmen, Highway Department, Town Counsel, Stormwater Committee	Complete within 1 year of the effective date of permit	2018

3.4.2 MCM 4 Implementation Plan

Per the 2016 Small MS4 General Permit, Hampden must develop and implement the following items, which will be adopted as regulation modifications or a formalized procedure. Note that while Hampden can choose to implement these items Town-wide, they are only required for disturbances within the regulated area that are greater than or equal to one acre or 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.

- A regulatory mechanism that requires the use of sediment and erosion control practices at construction sites, as well as controls for other wastes on construction sites such as demolition debris, litter, and sanitary wastes
- Written procedures for site inspections and enforcement of sediment and erosion control measures, including the responsible party for site inspections and enforcement authority, due within one year of the effective date of the permit

- 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
- 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
- Written procedures for site plan review and inspection and enforcement, due within one year of the effective date of the permit

BMP 4A Site Inspection and Enforcement of Erosion and Sediment Control (ESC) Measures

The Town implements and enforces a program to reduce pollutants in stormwater runoff discharged to the MS4 system from construction activities, including use of sediment and erosion control practices, at sites greater than one acre. The Town adopted a bylaw entitled *Erosion and Sediment Control for Stormwater Management* (Chapter XIV (A) of the Town Bylaws) in 2008 that provides guidance for site planning and stormwater runoff control during construction and post-construction to protect local water resources from discharges, with the Board of Selectmen serving as the enforcement agency.

Section 4.6 of Chapter XIV(A) requires that applicants arrange with the Designated Agent of the Board of Selectmen for initial, erosion control, bury, and final inspections. Applicants are further required to promptly correct failures to comply with the requirements of approved plans as notified in writing by the Designated Agent, or they will be subject to the bonding provisions of Section 9 or the penalty provisions of Section 10 of the bylaw. Refer to **Appendix E** for standard operating procedures (SOPs) and inspection forms developed by the Central Massachusetts Regional Stormwater Coalition (CMRSWC) for site inspections, inspections of erosion and sediment controls, and constructed stormwater BMPs.

BMP 4B Site Plan Review

Hampden shall modify the written procedures for site inspections and enforcement of sediment and erosion control measures to include procedures for receipt and consideration of information submitted by the public and for consideration of potential water quality impacts, evaluation of opportunities for use of LID and green infrastructure, a requirement for BMP inspections during- and post-construction, and procedures for tracking site reviews, inspections, and enforcement actions.

BMP 4C Erosion and Sediment Control

Hampden shall continue to implement and enforce the existing *Erosion and Sediment Control Bylaw* (Chapter XIV (A) of the Town General Bylaws) requirements for construction site operators to implement an ESC program on-site. Current procedures will be reviewed and modified if necessary to comply with the requirements of the 2016 Small MS4 General Permit.

BMP 4D Waste Control

The Town will modify the existing *Stormwater Management* bylaw to incorporate specific language requiring the control of waste materials, including but not limited to discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes.

3.4.3 MCM 4 Implementation Schedule

BMP	PY1	PY2	PY3	PY4	PY5
4A Construction By-Law and Regulations, Site Plan Review Procedures	●				
4B Site Inspections and Enforcement Procedures	●				
4C Erosion and Sediment Control	●				
4D Waste Control	●				

● = year due

3.4.4 MCM 4 Guidelines and Resources

The following links include Hampden specific regulatory documents and free or low-cost resources Hampden can use to supplement the Construction program.

EPA Construction General Permit SWPPP template and inspection forms
https://www.epa.gov/npdes/epas-2017-construction-general-permit-cgp-and-related-documents

Massachusetts Stormwater Handbook
https://www.mass.gov/guides/massachusetts-stormwater-handbook-and-stormwater-standards

EPA SWMP Resources – *Construction Site Runoff Control*
https://www.epa.gov/npdes-permits/stormwater-tools-new-england#csrc

EPA National Menu of BMPs for Stormwater
https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#constr

3.4.5 MCM 4 Checklist of Key Documentation

Documentation of BMP progress should be kept in Appendix F. The following checklist includes the required documentation for MCM 4. See Section 5 of this Plan for additional record keeping information.

- ☐ Number of site reviews, inspections, and enforcement actions
- ☐ Site inspection forms
- ☐ Modifications to Hampden's bylaws, regulations, policies, and/or procedures as necessary

3.5 MCM 5: Post-Construction Stormwater Management

Objective: *Reduce the discharge of pollutants found in stormwater through the retention or treatment of stormwater after construction on new or redeveloped sites.*

This section of the SWMP describes how to comply with the Stormwater Management in New Development and Redevelopment requirements in General Permit Section 2.3.6.

3.5.1 MCM 5 BMPs from NOI

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
5A	As-built Plans for On-Site Stormwater Control	Continue to implement and enforce the existing Erosion and Sediment Control Bylaw requirements for Local Stormwater Permit applicants to submit as-built plans for stormwater controls and to submit an operation, maintenance, and inspection agreement	Highway Department, Planning Board, Board of Selectmen, Stormwater Committee, Building Inspector	Continue to implement and enforce the existing bylaw	2018
5B	Inventory and Priority Ranking of MS4-Owned Properties for BMP Retrofits	Identify at least 5 permittee-owned properties that could be modified or retrofitted with BMPs to reduce impervious areas and update annually	Highway Department, Board of Selectmen, Planning Board, Town Administrator, Stormwater Committee, Building Inspector	Complete report no later than 4 years of permit effective date. Beginning in year 5 keep running list of at least 5 retrofit sites	2020
5C	Assess Allowing Green Infrastructure	Develop a report assessing existing local regulations to determine the feasibility of making green infrastructure practices allowable when appropriate site conditions exist	Highway Department, Board of Selectmen, Planning Board, Town Administrator	Complete 4 years after permit effective date and implement recommendations of report	2020
5D	Assess 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	Highway Department, Board of Selectmen, Planning Board, Town Administrator	Complete 4 years after permit effective date and implement recommendations of report	2020

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
5E	Post-Construction Bylaw and Regulations	Modify the Town's existing stormwater bylaw to contain new MS4 provisions per section 2.3.6.a.	Highway Department, Board of Selectmen, Town Administrator, Stormwater Committee, Building Inspector	Modify existing bylaw and/or regulations if necessary within 2 years of permit effective date	2019

3.5.2 MCM 5 Implementation Plan

BMP 5A As-built Plans for On-Site Stormwater Control

The Town shall continue to implement and enforce the existing *Erosion and Sediment Control for Stormwater Management* (Chapter XIV (A) of the Town's General Bylaws), passed in 2008, which requires that Local Stormwater Management Permit applicants submit as-built plans for stormwater controls and to submit an operation, maintenance, and inspection agreement. A requirement for as-built plans to be submitted no later than two years after completion of construction projects has been added to the Local Stormwater Management Permit application.

BMP 5B Retrofit Feasibility Assessment

The Town must identify at least five town-owned properties that could potentially be modified or retrofitted with BMPs designed to reduce the frequency, volume, and pollutant loads of stormwater discharges through a reduction of impervious area. This inventory must be updated annually starting in Permit Year 5.

Section 2.3.6.d of the 2016 Small MS4 General Permit describes factors and considerations for selecting potential sites with the goal of reducing impervious area and improving water quality. The Town should continue to look for cost-efficient opportunities to improve drainage, replace existing catch basins with deep sump catch basins, and add water quality BMPs.

BMP 5C Assess Allowing Green Infrastructure

As detailed in 2016 Small MS4 General Permit Section 2.3.6.c,the Town shall develop a report assessing local regulations to determine the feasibility of making green roofs, infiltration practices, and water harvesting devices allowable when appropriate site conditions exist. The Town shall implement all recommendations in accordance with the schedules contained in the assessment.

BMP 5D Assess Street Design and Parking Lot Guidelines

In accordance with General Permit Section 2.3.6.b, Hampden 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 Town to determine if changes to design standards for streets and parking lots can be made to support low impact design (LID) options. Input will be gathered from multiple Town departments. The final report will be appended to this SWMP once completed, and report recommendations will be implemented by Permit Year 9 with progress reported annually.

BMP 5E Post-Construction By-Law and Regulations

Hampden has met the requirement to implement and enforce a program to reduce pollutants in stormwater runoff discharged to the municipal drainage system from post-construction activities for all new development and redevelopment sites greater than one acre by adopting a bylaw entitled *Stormwater Management* (Chapter XIV of the Town's General Bylaws) in 2005 and *Erosion and Sediment Control for Stormwater Management* (Chapter XIV (A) of the Town's General Bylaws) in 2008. These bylaws provide guidance for site planning and stormwater runoff control during construction and post-construction to protect local water resources from discharges. The Board of Selectmen serves as the enforcement agency for the bylaw. The Town will need to review the existing bylaw and associated regulations with respect to the 2016 Small MS4 General Permit and modify as needed.

3.5.3 MCM 5 Implementation Schedule

BMP	PY1	PY2	PY3	PY4	PY5
5A Post-Construction By-Law and Regulations	✓				
5B Retrofit Feasibility Assessment				●	→
5C Assess Feasibility of Allowing Green Infrastructure				●	
5D Assess Street Design and Parking Lot Guidelines				●	
5E Post-Construction Bylaw and Regulations		●			

● = year due

3.5.4 MCM 5 Guidelines and Resources

The following links include free or low-cost resources Hampden can use to supplement the Post-Construction program.

Massachusetts Stormwater Handbook
https://www.mass.gov/guides/massachusetts-stormwater-handbook-and-stormwater-standards

EPA SWMP Resources – Post Construction Stormwater Control
https://www.epa.gov/npdes-permits/stormwater-tools-new-england#pcsm

EPA National Menu of BMPs for Stormwater
https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#post

EPA Small MS4 Permit Technical Support Document – *Stormwater Retrofit Techniques for Restoring Urban Drainages in Massachusetts and New Hampshire*
https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/BMPRetrofit.pdf

EPA – *Green Infrastructure Opportunities that Arise During Municipal Operations*
https://www.epa.gov/nep/green-infrastructure-opportunities-arise-during-municipal-operations

EPA - *Managing Stormwater in Your Community: A Guide for Building an Effective Post-Construction Program*
https://www3.epa.gov/npdes/pubs/stormwaterinthecommunity.pdf

EPA Managing Stormwater with LID Practices: Addressing Barriers to LID
https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/AddressingBarrier2LID.pdf

Metropolitan Area Planning Council LID Toolkit
https://www.mapc.org/resource-library/low-impact-development-toolkit/

3.5.5 MCM 5 Checklist of Key Documentation

Documentation of BMP progress should be kept in Appendix F. The following checklist includes the required documentation for MCM 5. See Section 5 of this Plan for additional record keeping information.

- ☐ Measures the Town has taken to ensure adequate long-term operation and maintenance of stormwater BMPs and to require submission of as-built plans
- ☐ Modifications to Hampden's bylaws, regulations, policies, and/or procedures as necessary
- ☐ Status of BMP 5C and 5D assessments, including any planned or completed changes to local regulations and guidelines (BMP 5C) and findings and progress towards making the practices allowable (BMP 5D)
- ☐ Retrofit inventory, including all sites that have been modified or retrofitted (BMP 5B). Sites should include town-owned sites identified in the inventory as well as non-municipal property modified or retrofitted to mitigate impervious area

3.6 MCM 6: Good Housekeeping and Pollution Prevention

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.*

This section of the SWMP describes how to comply with the Good Housekeeping and Pollution Prevention requirements in General Permit Section 2.3.7.

3.6.1 MCM 6 BMPs from NOI

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
6A	Operation & Maintenance (O&M) & Inventory	Create written O&M procedures for and an inventory of parks and open spaces, buildings and facilities, and vehicles and equipment within the Urbanized Area where pollutants are exposed to stormwater runoff, and locations where vehicles and equipment are stored, including all requirements contained in 2.3.7.a.ii.	Highway Department, Parks & Recreation Department	Complete and implement 2 years after permit effective date	2019
6B	MS4 Infrastructure O&M Program	Establish and implement program for repair and rehabilitation of MS4 infrastructure	Highway Department	Complete and implement 2 years after permit effective date	2019

BMP ID	BMP Category	BMP Description	Responsible Department/ Parties	Measurable Goal	Beginning Year of BMP Implementation
6C	Stormwater Pollution Prevention Plan (SWPPP)	Create SWPPPs for maintenance garages, transfer stations, and other waste handling facilities	Highway Department, Board of Health	Complete 2 years after effective date of permit	2019
6D	Catch Basin Cleaning Program	Implement procedures and schedule to optimize catch basin cleaning such that each catch basin is no more than 50% full	Highway Department	Track frequency and material quantity of catch basin cleaning in Town. In first Annual Report and in SWMP, document plan for optimizing catch basin cleaning	2018
6E	Street Sweeping Program	Sweep all streets and permittee-owned parking lots in accordance with permit conditions	Highway Department	Sweep all streets and permittee-owned parking lots once per year in the spring and once in the fall. Rural uncurbed roads under exemption may be swept once per year. Document procedures in SWMP	2018
6F	Winter Road Maintenance Program	Minimize use of sand in deicing operations, and evaluate opportunities for use of alternative materials to sodium chloride and other salts during winter maintenance	Highway Department	Implement salt use optimization during deicing season, document salt use optimization procedures in SWMP and Annual Report	2018
6G	Inspection and Maintenance of Stormwater Treatment Structures	Develop inspection and maintenance procedures and frequencies for all stormwater treatment structures	Highway Department	Inspect and maintain 100% of treatment structures to ensure proper function, document inspection and maintenance procedures in SWMP	2018

3.6.2 MCM 6 Implementation Plan

BMP 6A Operation & Maintenance (O&M) Procedures & Inventory

Hampden must develop a written Town-Wide O&M Program for municipal facilities and equipment, including parks and open space, buildings and facilities, including schools, where pollutants are exposed to stormwater runoff, and vehicles and equipment. This plan will include an inventory of the municipally-owned facilities and equipment. The inventory and written program will be appended to this SWMP.

BMP 6B MS4 Infrastructure O&M Procedures

The Town shall develop a plan describing the activities and procedures used to maintain MS4 infrastructure in a timely manner to reduce the discharge of pollutants from the MS4. The written program developed under this BMP will be appended to the SWMP.

BMP 6C Stormwater Pollution Prevention Plan (SWPPP)

In accordance with General Permit Section 2.3.7.b, Hampden must develop and implement SWPPPs for Town-owned or operated waste handling facilities where pollutants are exposed to stormwater, including the transfer station and the Highway Department maintenance garage. SWPPP requirements include "regular" employee training for all members of the Pollution Prevention Team (at a minimum). Additionally, quarterly site inspections are required at these sites according to 2016 Small MS4 General Permit Section 2.3.7.b.iii.

BMP 6D Catch Basin Cleaning Program

The Town must clean and inspect catch basins to make sure that catch basins are no more than 50% full, and develop and implement a program to optimize routine inspections, cleaning, and maintenance of catch basins. If a catch basin is consistently less than 50% fill, the Town can reduce the frequency of cleanings. If a catch basin is more than 50% full during two consecutive cleanings/inspections, the Town must investigate the contributing drainage area for sources of excessive sediment loading and abate contributing sources when possible. The Town must also store and dispose/reuse catch basin cleanings according to MassDEP policies. Refer to the Standard Operating Procedure (SOP) for Catch Basin Cleaning in **Appendix I** for additional recommendations and guidance.

BMP 6E Street Sweeping Program

The Town must establish and implement procedures for sweeping and/or cleaning streets and Town-owned parking lots. All streets must be swept and/or cleaned at least twice per year (excluding rural streets with no curbs or catch basins). More frequent sweeping shall occur in targeted areas on the basis of pollutant load reduction potential. Street sweepings must be stored and disposed/reused according to MassDEP policies. For rural streets with no curbs or catch basins, the Town must sweep at least once per year or develop a targeted inspection and sweeping plan for those streets. Refer to the SOP for Street Sweeping in **Appendix I** for additional recommendations and guidance.

BMP 6F Winter Road Maintenance Program

The Town shall establish and implement procedures for winter road maintenance, including the use and storage of salt and sand and the evaluation of at least one salt/chloride alternative for use in the municipality. Refer to the SOP for Winter Road Maintenance in **Appendix I** for additional recommendations and guidance.

BMP 6G Stormwater Treatment Structures Inspection and Maintenance Procedures

The Town shall develop inspection and maintenance procedures and frequencies for all stormwater treatment structures. An important first step will be to improve the inventory, mapping, and record keeping procedures for Town-owned or operated stormwater BMPs, such as detention ponds and swales. The inventory should be developed within two years of the permit effective date.

All Town-owned water quality BMPs must be inspected annually at a minimum. Note that drainage manholes and catch basins are not considered stormwater treatment structures for this BMP (structure maintenance procedures will be developed and implemented under BMPs 6B and 6D). Refer to the CMRSWC SOP for inspection of constructed stormwater BMPs included in **Appendix E**.

3.6.3 MCM 6 Implementation Schedule

BMP	PY1	PY2	PY3	PY4	PY5
6A O&M Program Procedures & Inventory		●			
6B MS4 Infrastructure O&M Program		●			
6C Stormwater Pollution Prevention Plans (SWPPPs)		●			
6D Catch Basin Cleaning Program	● →	→	→	→	→
6E Street Sweeping Program	● →	→	→	→	→
6F Winter Road Maintenance Program	● →	→	→	→	→
6G Inspection and Maintenance of Stormwater Treatment Structures	●	●	●	●	●

● = annual requirement or year due

→ = ongoing requirement

3.6.4 MCM 6 Guidelines and Resources

The following links include free or low-cost resources Hampden can use to supplement the Good Housekeeping and Pollution Prevention program.

EPA Stormwater Management Program Resources – Good Housekeeping
https://www.epa.gov/npdes-permits/stormwater-tools-new-england#gh

EPA National Menu of BMPs for Stormwater
https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#poll

CWP Municipal Pollution Prevention/Good Housekeeping Practices
https://owl.cwp.org/mdocs-posts/urban-subwatershed-restoration-manual-series-manual-9/

MassDEP Management of Catch Basin Cleanings
https://www.mass.gov/files/documents/2018/03/09/catch-basins.pdf

MassDEP Reuse & Disposal of Street Sweepings
https://www.mass.gov/files/documents/2018/05/14/street-sweepings.pdf

MassDEP Snow Disposal Guidance
https://www.mass.gov/guides/snow-disposal-guidance

CMRSWC SOP 9: Inspecting Constructed BMPs
https://www.centralmastormwater.org/sites/centralmastormwater/files/uploads/constructed_bmp_inspection_sop_final.pdf

3.6.5 MCM 6 Checklist of Key Documentation

Documentation of BMP progress should be kept in Appendix F. The following checklist includes the required documentation for MCM 6. See Section 5 of this Plan for additional record keeping information.

- ☐ O&M procedures for municipal facilities and equipment
- ☐ Inventory of municipal facilities and equipment
- ☐ Plan for optimizing catch basin cleaning, metrics regarding the number of catch basins, quantity cleaned and inspected, and total volume of material removed
- ☐ Miles of streets cleaned and the volume of material removed
- ☐ All records associated with SWPPP quarterly site inspections, maintenance activities, and training
- ☐ Inventory of Town-owned or operated stormwater treatment structures
- ☐ Inspection and maintenance procedures for Town-owned or operated stormwater treatment structures, including maintenance schedules and inspection results.

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SECTION 4

Section 4
BMPs to Address Specific Waterbody Requirements

4.1 Long Island Sound TMDL for Nitrogen

As described in Section 3.2.3, the Town of Hampden is located within the Connecticut River watershed, which in turn is located within the Long Island Sound watershed. The Long Island Sound has an EPA-approved TMDL for Nitrogen. Discharges from MS4s in Massachusetts to waters that are tributaries to the Long Island Sound are subject to the requirements of the 2016 MA Small MS4 General Permit Appendix F, part B.1.

4.1.1 Enhanced BMPs

4.1.1.1 MCM 1: Public Education and Outreach

BMPs 1A/1B: Education and outreach to Residential and Business / Commercial / Institutional stakeholders will be supplemented with annual timed messages on specific topics as follows:

- April/May: annual message in the spring that encourages the proper use and disposal of grass clippings and the proper use of slow-release fertilizers
- June/July: annual message in the summer that encourages the proper management of pet waste, including noting any existing ordinances where appropriate
- August/September/October: annual message in the fall that encourages the proper disposal of leaf litter

4.1.1.2 MCM 3: IDDE Program

BMP 3D: Per Section 2.3.4.7.a.iii. of the 2016 Small MS4 General Permit, outfalls to receiving waters associated 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 should be identified as High Priority outfalls. As the entirety of the Town is located within the Connecticut River / Long Island Sound watershed, ranking all outfalls within the Town as High Priority does not allow for differentiation or priority use of resources in the IDDE Program. Therefore, upon the development of the final Nitrogen Source Identification Report in permit year four, potential catchments determined to have high nitrogen loading will be reassessed as High Priority catchments.

4.1.1.3 MCM 5: Stormwater Management in New Development and Redevelopment

BMP 5A: The Town's existing Stormwater Management Bylaw or Rules and Regulations will be modified to contain new provisions related to optimization of stormwater management BMPs for nitrogen removal.

BMP 5D: The report containing a detailed inventory of MS4-owned properties and a running list of at least 5 sites that have potential for retrofits that will be developed will include options for nitrogen-reduction BMPs with a listing of planned structural BMPs and a plan and schedule for implementation.

4.1.1.4 MCM 6: Good Housekeeping and Pollution Prevention

BMP 6A: Written O&M procedures for permittee-owned properties will include procedures for proper management of fertilizers, grass cuttings, and leaf litter, and will establish requirements for use of slow-release fertilizers on permittee-owned property.

BMP 6D: Street sweeping of all municipally owned streets and parking lots will be increased to two times per year (spring and fall) except rural streets with no curbs or catch basins, which the Town must sweep at least once per year or develop a targeted inspection and sweeping plan.

4.1.2 Other Enhanced Requirements

Nitrogen Source Identification Report: Appendix F, part B.1 of the 2016 MA Small MS4 General Permit requires the development and submission of a Nitrogen Source Identification Report as part of the year 4 annual report, and the evaluation of all properties identified as presenting retrofit opportunities or areas for structural BMP installation as part of MCM 5 or identified in the Nitrogen Source Identification Report in the year 5 annual report.

Annual Report: The annual report will contain a table tracking existing structural BMPs installed in the Town from the Table 3 list in Attachment 1 of Appendix H of the 2016 Small MS4 General Permit, the total area treated by the design storage volume, and the estimated nitrogen removed per year.

4.2 Additional Requirements for Discharges to Surface Drinking Water Supplies and Their Tributaries

According to Section 3.0 of the 2016 Small MS4 General Permit, MS4s that discharge to public surface drinking water supply sources or their tributaries should consider these waters a priority in the implementation of the SWMP. As of the date of this SWMP, there are no public surface drinking water supply sources or their tributaries located within the Town of Hampden's regulated area.

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SECTION 5

Section 5
Program Evaluation, Record Keeping, and Reporting

5.1 Program Evaluation

The Town of Hampden will annually self-evaluate its compliance with the terms and conditions of the 2016 MA Small MS4 permit, the appropriateness of the selected BMPs in achieving the objectives of each MCM, and progress towards achieving the identified measurable goal. Each self-evaluation will be submitted in the Annual Report, and annual evaluation documentation will be maintained as part of the SWMP.

5.2 Record Keeping

The Town will keep all records required by the 2016 Small MS4 General Permit for at least five years, including, but not limited to the following key information:

- Monitoring results
- Copies of reports
- Records of outfall/interconnection screening
- Follow-up and elimination of illicit discharges
- Maintenance records
- Inspection records

Checklists of record keeping items Hampden should maintain are also included under each BMP in Section 3 of the SWMP. Records relating to the 2016 Small MS4 General Permit, including the SWMP, will be made available to the public, as required by Section 4.2.c of the 2016 Small MS4 General Permit.

5.3 Annual Reports

The Town will submit annual reports each year of the Small MS4 permit term, due 90 days from the close of each reporting period (i.e., September 28). The reporting period will be a one-year period commencing on the permit effective date, and subsequent anniversaries thereof, except that the first annual report under the 2016 Small MS4 General Permit shall also cover the period from May 1, 2018 to the permit effective date, July 1, 2018.

Under the 2016 General Permit, annual reports will consist of an update provided to EPA and more robust documentation included in **Appendix F** of this SWMP. Per Section 4.4.b of the 2016 Small MS4 General Permit, the annual reports shall contain the following information:

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

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

iii. The status of any plans or activities required by part 2.1 and/ or part 2.2, including:

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

iv. An assessment of the progress towards achieving the measurable goals and objectives of each control measure in part 2.3 including:

- *Evaluation of the public education program including a description of the targeted messages for each audience; method of distribution and dates of distribution; methods used to evaluate the program; and any changes to the program.*
- *Description of the activities used to promote public participation including documentation of compliance with state public notice regulations.*
- *Description of the activities related to implementation of the IDDE program including: status of the map; status and results of the illicit discharge potential ranking and assessment; identification of problem catchments; status of all protocols described in part 2.3.4.(program responsibilities and systematic procedure); number and identifier of catchments evaluated; number and identifier of outfalls screened; number of illicit discharges located; number of illicit discharges removed; gallons of flow removed; identification of tracking indicators and measures of progress based on those indicators; and employee training.*
- *Evaluation of the construction runoff management including number of project plans reviewed; number of inspections; and number of enforcement actions.*
- *Evaluation of stormwater management for new development and redevelopment including status of ordinance development (2.3.6.a.ii.), review and status of the street design assessment (2.3.6.b.), assessments to barriers to green infrastructure (2.3.6.c), and retrofit inventory status (2.3.6.d.)*
- *Status of the O&M Programs required by part 2.3.7.a.*
- *Status of SWPPP required by part 2.3.7.b. including inspection results.*
- *Any additional reporting requirements in part 3.0.*

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

vi. Description of activities for the next reporting cycle.

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

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

5.4 SWMP Modifications

Per Section 4.1 of the 2016 Small MS4 General Permit, the Town shall complete the following tasks:

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.

The Town may update or revise the SWMP as needed as the Town's activities are modified, changed, or updated to meet permit conditions during the permit term. If it is necessary to modify or update the SWMP, the Town should follow this procedure to formalize the changes:

- Keep a log with a description of the modification, the date, and the name and signature of the person making it
- Re-sign and date the certification statement in Section 6 of this SWMP

An amendment log and certification statements are located in **Appendix G**.

Tighe&Bond

SECTION 6

Section 6
SWMP 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."

Name: ROBERT T. MARKEL Title: TOWN ADMINISTRATOR

Signature: Robert T. Markel Date: 10/6/2021

J:\H\H1436 Hampden\021 - MS4 Year 4 Compliance\Reports\SWMP Updates\Town of Hampden SWMP_text_2021.docx

APPENDIX A

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

Part I: General Conditions

General Information

Name of Municipality or Organization: Town of Hampden | State: MA

EPA NPDES Permit Number (if applicable): MAR041009

Primary MS4 Program Manager Contact Information

Name: Mark F. Langone | Title: Highway Superintendent

Street Address Line 1: 589 Main Street

Street Address Line 2:

City: Hampden | State: MA | Zip Code: 01036

Email: highway@hampden.org | Phone Number: (413) 566-8842

Fax Number:

Other Information

Stormwater Management Program (SWMP) Location (web address or physical location, if already completed): Physical location: 589 Main Street, Hampden

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

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)*: 100%

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)

Copy of map is attached

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)*: Yes | Effective Date or Estimated Date of Adoption (MM/DD/YY): 04/25/05

Construction/Erosion and Sediment Control (ESC) Authority Adopted? *(Part II,III,IV or V, Subpart B.4.(a.) of 2003 permit)*: Yes | Effective Date or Estimated Date of Adoption (MM/DD/YY): 04/28/08

Post- Construction Stormwater Management Adopted? *(Part II, III, IV or V, Subpart B.5.(a.) of 2003 permit)*: Yes | Effective Date or Estimated Date of Adoption (MM/DD/YY): 04/28/08

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

Part II: Summary of Receiving Waters

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

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

Waterbody that receives flow from the MS4 and segment ID if applicable	Number of outfalls into receiving water segment	Chloride	Chlorophyll-a	Dissolved Oxygen/ DO Saturation	Nitrogen	Oil & Grease/ PAH	Phosphorus	Solids/ TSS/ Turbidity	E. coli	Enterococcus	Other pollutant(s) causing impairments
South Branch Mill River	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to South Branch Mill River	14	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to Mill Pond	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to Sawmill Brook	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Scantic River (MA34-30)	3	☐	☐	☐	☐	☐	☐	☐	☐	☐	Category 2 water - attaining some uses, other uses not assessed
Wetland/Tributary to Scantic River	11	☐	☐	☐	☐	☐	☐	☐	☐	☐	Category 2 water - attaining some uses, other uses not assessed
Watchaug Brook	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Wetland/Tributary to Watchaug Brook	7	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Isolated Wetland off of Stony Hill Road	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Isolated Wetland off of Genevieve Drive	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Isolated Wetland off of Circle View Drive	1	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Isolated Wetland off of Andrew Circle	2	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Outside Receiving	24	☐	☐	☐	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	☐	
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		☐	☐	☐	☐	☐	☐	☐	☐	☐	

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**
Multi-media methods	Distribute an annual message in the spring (Apr/May) that encourages proper use and disposal of grass clippings and encourages use of slow-release fertilizers Distribute an annual message in the summer (Jun/Jul) that encourages proper management of pet waste Distribute an annual message in the fall (Aug/Sept/Oct) that encourages proper disposal of leaf litter	1A - Residents	PVPC CRSWC, Hwy. Dept., Bd. of Selectmen, Town Admin., Pl. Bd.	Distribute a minimum of three (3) timed messages annually on specific Nitrogen TMDL related topics	2018

Multi-media methods	Distribute an annual message in the spring (Apr/May) that encourages proper use and disposal of grass clippings and encourages use of slow-release fertilizers Distribute an annual message in the summer (Jun/Jul) that encourages proper management of pet waste Distribute an annual message in the fall (Aug/Sept/Oct) that encourages proper disposal of leaf litter	1B - Businesses, Institutions and Commercial Facilities	PVPC CRSWC, Hwy. Dept., Bd. of Selectmen, Town Admin., Pl. Bd.	Distribute a minimum of three (3) timed messages annually on specific Nitrogen TMDL related topics	2019
Multi-media methods	Education and outreach on stormwater management topics of significance in Hampden (including proper erosion and sedimentation control, permit requirements, and design standards). Educational topics will include but are not limited to those in Part 2.3.2.d.iii	1C - Developers (construction)	PVPC CRSWC, Hwy. Dept., Bd. of Selectmen, Town Admin., Pl. Bd.	Distribute the first of a minimum of two (2) educational messages spaced at least a year apart.	2018

Multi-media methods	Education and outreach on stormwater management topics of significance in Hampden (including pollution prevention, illicit discharges, information about the Multi-Sector General Permit). Educational topics will include but are not limited to those in Part 2.3.2.d.iv	1D - Industrial Facilities	PVPC CRSWC, Hwy. Dept., Bd. of Selectmen, Town Admin., Pl. Bd.	Distribute a minimum of two (2) educational messages spaced at least a year apart.	2019

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 Implementation
2A - Public Review	SWMP available for public review at Highway Department office	Highway Department	Allow annual review of stormwater management plan and posting of stormwater management plan on website	2019
2B - Public Participation	Provide public participation opportunities	All Town Departments, Boards, and Committees	Allow public to comment on stormwater management plan annually	2019

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**
3A - Inventory of All Identified Sanitary Sewer Overflows (SSOs) within Previous 5 Years	No SSO inventory is needed at this time as the Town is not sewered. If sewer service is added, develop SSO inventory in accordance with permit conditions	Not applicable	Not applicable at this time	N/A
3B - Storm sewer system map	Outfall inventory complete. Improve map as new data is collected. Add data to GIS map as required by Section 2.3.4.5, including interconnections with other MS4 systems, waterbody use impairments, and catchment delineations	Highway Department	Update map within 2 years of effective date of permit and complete full system map 10 years after effective date of permit	2018
3D - Written IDDE program	Develop written IDDE program	Highway Department	Complete written IDDE program within 1 year of the effective date of permit, update components annually as needed	2018
3E - Dry Weather Outfall and Interconnection Screening and Sampling	Perform dry weather outfall, interconnection screening and sampling as needed in accordance with outfall screening procedure and permit conditions	Highway Department	Complete 3 years after permit effective date. Track number of illicit discharges identified and volume removed. Summarize sampling results	2018

3F - Catchment Investigations and Wet Weather Screening and Sampling	Develop investigation procedures and priority ranking of catchments based on System Vulnerability Factors and evaluate catchments according to ranking, IDDE Program, and permit conditions	Highway Department	Complete 10 years after permit effective date. Track number and percentage of MS4 catchments evaluated. Track number of illicit discharges identified and volume removed. Summarize screening / sampling results	2019
3G - Ongoing screening	Reprioritize each outfall or interconnection, schedule ongoing dry and wet weather screening	Highway Department	Complete ongoing outfall screening upon completion of IDDE program	2018
3H - Employee Training	Provide internal training to employees involved in IDDE program and utilize PVPC CRSWC sponsored training	Highway Department, PVPC CRSWC	Train annually, report on the frequency and type of employee training in each annual report	2018

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**
4A - Site Inspection and Enforcement of Erosion and Sediment Control (ESC) measures	Continue to implement and enforce the existing site inspection procedures within the Erosion and Sediment Control Bylaw (Chapter XiV (A) of the General Bylaws)	Planning Board, Board of Selectmen, Highway Dept., Building Inspector	Review current procedures and modify if necessary within 1 year of permit effective date	2018
4B - Site Plan Review	Modify the existing by-law to include evaluation of opportunities for use of low impact design and green infrastructure	Planning Board, Board of Selectmen, Highway Dept., Town Counsel	Complete modifications within 1 year of permit effective date. Include tracking information regarding the number of site reviews, inspections, and enforcement actions in the annual report	2018
4C - Erosion and Sediment Control	Continue to implement and enforce the existing Erosion and Sediment Control Bylaw requirements for construction site operators to implement an ESC program	Planning Board, Board of Selectmen, Highway Dept., Town Counsel	Review current procedures and modify if necessary within 1 year of the effective date of permit	2018
4D - Waste Control	Incorporate requirements to control wastes into the existing bylaw, including but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes	Planning Board, Board of Selectmen, Highway Dept., Town Counsel	Complete within 1 year of the effective date of permit	2018

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

Part III: Stormwater Management Program Summary (continued)

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

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**
5A - As-built Plans for On-Site Stormwater Control	Continue to implement and enforce the existing Erosion and Sediment Control Bylaw requirements for Local Stormwater Management Permit applicants to submit as-built plans for stormwater controls and to submit an operation, maintenance, and inspection agreement	Highway Department, Planning Board, Board of Selectmen	Continue to implement and enforce the existing by-law	2018
5B - Inventory and Priority Ranking of MS4-Owned Properties for BMP Retrofits	Identify at least 5 permittee-owned properties that could be modified or retrofitted with BMPs to reduce impervious areas and update annually	Highway Dept., Board of Selectmen, Planning Board, Town Administrator	Complete report no later than 4 years of permit effective date. Beginning in year 5 keep running list of at least 5 retrofit sites	2020
5C - Assess Allowing Green Infrastructure	Develop a report assessing existing local regulations to determine the feasibility of making green infrastructure practices allowable when appropriate site conditions exist	Highway Dept., Board of Selectmen, Planning Board, Town Administrator	Complete 4 years after effective date of permit and implement recommendations of report	2020

5D - Assess 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.	Highway Dept., Board of Selectmen, Planning Board, Town Administrator	Complete 4 years after effective date of permit and implement recommendations of report	2020
5E - Post-Construction Bylaw and Regulations	Modify the Town's existing stormwater bylaw to contain new MS4 provisions per section 2.3.6.a.	Highway Department, Board of Selectmen, Town Administrator	Modify existing bylaw and/or regulations if necessary within 2 years of permit effective date	2019

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**
6A - Operations & Maintenance (O&M) Procedures & Inventory	Create written O&M procedures for and an inventory of parks and open spaces, buildings and facilities, and vehicles and equipment within the Urbanized Area where pollutants are exposed to stormwater runoff, and locations where vehicles and equipment are stored, including all requirements contained in 2.3.7.a.ii	Highway Department, Parks & Recreation Department	Complete and implement 2 years after effective date of permit	2019
6B - MS4 Infrastructure O&M Program	Establish and implement program for repair and rehabilitation of MS4 infrastructure	Highway Department	Complete and implement 2 years after effective date of permit	2019
6C - Stormwater Pollution Prevention Plan (SWPPP)	Create SWPPPs for maintenance garages, transfer stations, and other waste-handling facilities	Highway Department	Complete 2 years after effective date of permit	2019
6D - Catch Basin Cleaning Program	Implement procedures and schedule to optimize catch basin cleaning such that each catch basin is no more than 50% full	Highway Department	Track frequency and material quantity of catch basin cleaning in town. In first Annual Report and in SWMP, document plan for optimizing catch basin cleaning	2018

6E - Street Sweeping Program	Sweep all streets and permittee-owned parking lots in accordance with permit conditions	Highway Department	Sweep all streets and permittee-owned parking lots once per year in the spring and once in the fall. Rural uncurbed roads under exemption may be swept once per year. Document procedures in SWMP	2018
6F - Winter Road Maintenance Program	Minimize use of sand in deicing operations, and evaluate opportunities for use of alternative materials to sodium chloride and other salts during winter maintenance	Highway Department	Implement salt use optimization during deicing season, document salt use optimization procedures in SWMP and Annual Report	2018
6G - Inspection and Maintenance of Stormwater Treatment Structures	Develop inspection and maintenance procedures and frequencies for all stormwater treatment structures	Highway Department	Inspect and maintain 100% of treatment structures to ensure proper function, document inspection and maintenance procedures in SWMP	2018

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)
Long Island Sound TMDL (Nitrogen)	Adhere to requirements in part B.I of Appendix F	Highway Department

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

Part III: Stormwater Management Program Summary (continued)

Actions for Meeting Requirements Related to Water Quality Limited Waters

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

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

Part IV: Notes and additional information

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

1. The Scantic River (MA34-30) is the only water within the Town of Hampden identified in the Massachusetts Year 2014 Integrated List of Waters; it is classified as a Category 2 Water: Some Uses Attained, Other Uses Not Assessed.

2. BMPs identified in the 2003 General Permit NOI have evolved over the permit term due to staff changes and Stormwater Program modifications. The intent of the 2003 BMPs are being met under the proposed 2016 General Permit BMPs, to be further described in the Stormwater Management Plan. The Stormwater Management Plan will describe how the BMPs under the 2003 permit fit into the new program, particularly where BMPs and/or measurable goals that are outdated or no longer appropriate have been replaced or updated.

3. The Federal Endangered Species Eligibility Determination screening process has been completed and the Town of Hampden meets Criterion C. Per the official species list from the US Fish & Wildlife Service (USFWS) New England Ecological Services Field Office, the Northern Long-eared bat may exist in the Town, as it is listed as potentially present State-wide in Massachusetts. Based on an assessment of the Town's stormwater discharge and discharge-related activities, the Town's stormwater discharges and discharge related activities will have no affect on listed species or critical habitat. If, during the course of the permit term, the Town plans to install a structural stormwater BMP not identified in the NOI, the Town will conduct an endangered species screening for the proposed site and will contact the USFWS if it 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.

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

5. The outfalls and associated receiving waters in Part II are based on mapping as of September 2018 and are subject to change during implementation of the Stormwater Program as newly constructed outfalls are added to the map and inventory; locations are adjusted; or outfalls are removed if they are determined to be non-municipally owned/operated or reclassified as a BMP inlet, culvert, or other structure. Changes to the outfall inventory and mapping will be formalized in Annual Reports to EPA.

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

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: Vincent Villamaino

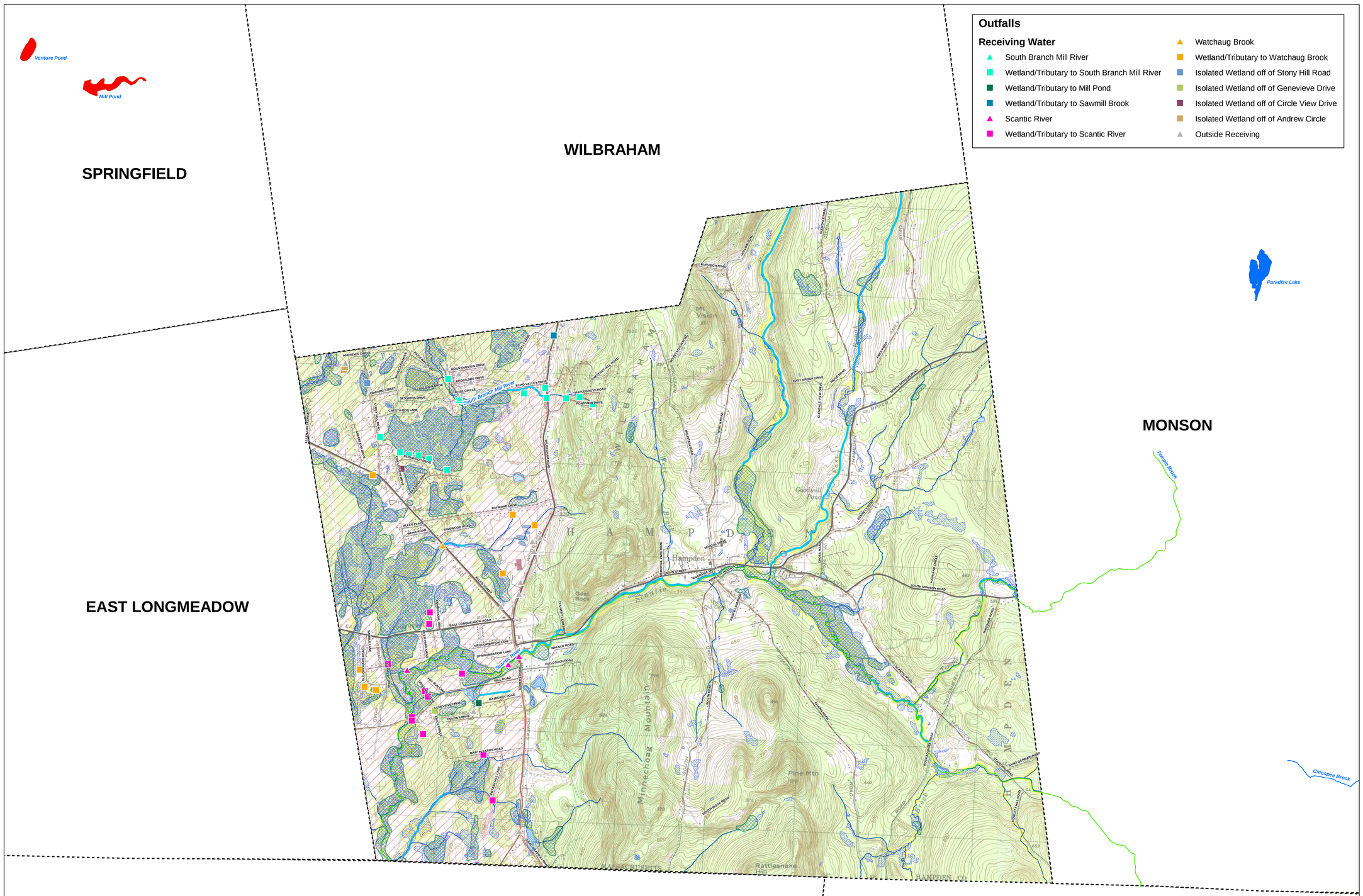
Title: Chair, Board of Selectmen

Signature:

Date: 9/25/18

[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



Outfalls and Receiving Waterbodies

LEGEND

- Major Road - Collector
- Minor Street or Road
- Stream/Intermittent Stream
- NWI Rivers and Streams
- Urban Area (2000 and 2010 Census)
- 100 Year Flood Zone
- Public Surface Water Supply (PSWS)
- Water Bodies
- Inland Wetlands
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine
- Town Boundary

Water Body Segments - Rivers

- 2 - Attaining some uses; other uses not assessed
- 3 - No uses assessed
- 4A -Impaired - TMDL is completed
- 4C - Impairment not caused by a pollutant
- 5 - Impaired - TMDL required

Water Body Segments - Lakes, Estuaries

- 2 - Attaining some uses; other uses not assessed
- 3 - No uses assessed
- 4A -Impaired - TMDL is completed
- 4C - Impairment not caused by a pollutant
- 5 - Impaired - TMDL required

LOCUS MAP



0 3,300
Feet

1:19,800

NOTES

1. Based on USGS Topo Map (1987)
2. MassGIS: 2014 Integrated List Data (2016), Major Drainage Basins (2003), Subbasins (2007), Community Boundary (2017), National Wetlands Inventory (2007), FEMA National Flood Hazard (2017), MassDOT Major Roads (2014)
3. Town of Hampden: Outfalls

Notice of Intent
Hampden, Massachusetts

September 2018

Tighe&Bond
Engineers | Environmental Specialists

C:\Users\ABC\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\2BXL250D\NOIReceivingWaterMap_24x36_Hampden_New_1.0_EPC.mxd Date Saved: 9/28/2018 User: ABC

H-1436

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

VIA EMAIL

April 5, 2019

Vincent Villamaino
Chair, Board of Selectmen

And;

Mark F. Langone
Highway Superintendent
589 Main Street
Hampden, MA. 01036
highway@hampden.org

Re: National Pollutant Discharge Elimination System Permit ID #: MAR041009, Town of Hampden

Dear Mark F. Langone:

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

Tighe&Bond

APPENDIX B

Appendix B
Summary of 2003 and 2016 MS4 General Permit BMPs

BMPs identified in the 2003 General Permit NOI have evolved over the permit term due to staff changes and Stormwater Program modifications; 2003 BMPs listed below are current as of the 2018 Annual Report. The intent of the 2003 BMPs are being met under the following 2016 General Permit BMPs per the NOI:

MCM 1: Public Education and Outreach

1A – Educational Displays – now under BMP 1 (A-D)
1B – Educational Pamphlets – now under BMP 1 (A-D)
1C – Classroom Education – now under BMP 1A and 2B
1D – Community Website & Hotline – now under BMPs 1 (A-D) and 2B
1E – Hazardous Waste Collection Day – now under BMPs 1A and 2B

MCM 2: Public Involvement and Participation

2A – Adopt-a-Road Program – now under BMP 2B
2B – Storm Drain Stenciling – now under BMP 2B
2C – Stormwater Committee – now under BMPs 2A and 2B
2D – Attitude Survey – now under BMPs 1 (A-D) and 2B

MCM 3: Illicit Discharge Detection and Elimination

3A – Mapping Stormwater Outfalls – now under BMP 3C
3B – DPW Employee Education – now under BMP 3E
3C – Non-Stormwater Discharge Ordinance – now under BMP 3A
3D – Development of Illicit Discharge Plan – now under BMP 3D

MCM 4: Construction Site Stormwater Runoff Control

4A – Construction Runoff Ordinance – now under BMP 4A
4B – Construction Plan Review – now under BMP 4A
4C – Inspection / Reporting – now under BMP 4B)
4D – Building Permit Application – now under BMPs 4A and 4B)

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

5A – Post Construction Runoff Ordinance – now under BMP 5A
5B – Site Plan Review – now under BMPs 4A and 5A
5C – Stormwater System Management Plan – now under BMPs 6B and 6F
5D – Training of Town Officials– now under BMPs 1A and 3E

MCM 6: Pollution Prevention and Good Housekeeping in Municipal Operations

6A – Municipal Maintenance Activity Program – now under BMPs 6A, 6B, 6F
6B – Training of Municipal Employees – now under BMP 3E
6C – Stormwater Pollution Prevention Plan / MSGP – now under BMP 6G
6D – Catch Basin Cleaning Program – now under BMP 6C

BMPs for Meeting Total Maximum Daily Load (TMDL) Waste Load Allocations

7A – Long Island Sound TMDL for Nitrogen, BMPs 1D, 2A, 2B, 3B, 4B, 4C, 5B, 6A, 6C, 6D – now under Part III Actions for Meeting TMDL Requirements (Long Island Sound TMDL for Nitrogen, requirements in part B.I of Small MS4 GP Appendix F)

Tighe&Bond

APPENDIX C

Endangered Species Act Eligibility Certification

TO: Town of Hampden Stormwater Management Program Files

FROM: Tighe & Bond

COPY: Mark Langone, Highway Superintendent, Town of Hampden

DATE: September 14, 2018, updated June 24, 2019

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

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

Tighe & Bond went to the USFWS Information for Planning and Consultation (IPaC) website[2] and requested an Official Species List from the USFWS New England Ecological Services Field Office, included in Attachment B to this memorandum. The Official Species List lists the following species that may occur or could potentially be affected by activities in the Town:

- Northern Long-eared Bat.

The Official Species List documents that there are no critical habitats in Hampden.

Tighe & Bond then went to the USFWS New England Field Office website for Endangered Species Reviews/Consultations[3] and selected the Massachusetts state list[4] to review which Towns have federally-listed species. A copy of the list of Federally Listed Endangered and Threatened Species in Massachusetts is included in Attachment C to this memorandum. Based on review of this list, in Hampden County the Northern Long-eared Bat is listed as potentially present Statewide.

Tighe & Bond then reviewed Step 1 Part B of the USFWS endangered species consultation, and visited the Massachusetts Natural Heritage and Endangered Species Program (NHESP) species information and conservation website about the Northern Long-eared Bat[5].

[1] Revised General Permit effective date according to June 29, 2017 EPA memorandum from the EPA Region 1 Acting Regional Administrator.

[2] http://ecos.fws.gov/ipac/

[3] https://www.fws.gov/newengland/EndangeredSpec-Consultation_Project_Review.htm

[4] https://www.fws.gov/newengland/pdfs/MA%20species%20by%20town.pdf

[5] http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/species-information-and-conservation/rare-mammals/northern-long-eared-bat.html

The NHESP website included a map showing the known locations of the Northern Long-eared Bat within Massachusetts. Attachment D to this memorandum includes a map showing that there are no roost trees or hibernating locations in the vicinity of the Town of Hampden.

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

Step 1 – Determine if you can meet USFWS Criterion A

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

No, the Town of Hampden's IPaC action area potentially contains a federally listed species, the Northern Long-eared Bat.

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

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

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

No, the Town of Hampden's action area does not contain any of the above listed species based on the official species list provided by the USFWS New England Ecological Services Field Office.

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

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

1) Does your action area contain one or more of the following species: Northern Long-eared Bat, Sandplain gerardia, Small whorled Pogonia and/or American burying beetle and does not contain any following species: Dwarf wedgemussel, Northeastern bulrush, Piping Plover, Northern Red-bellied cooter, Bog Turtle, Roseate Tern, Puritan tiger beetle, and Northeastern beach tiger beetle?

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

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

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

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

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

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

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Attachment A

Appendix C of U.S. EPA's National Pollutant Discharge Elimination System (NPDES) General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) in Massachusetts

APPENDIX C
ENDANGERED SPECIES GUIDANCE

A. Background

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Step 1 – Determine if you can meet USFWS Criterion A

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

USFWS Effects Determination Guidance:

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

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

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

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

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

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

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

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

Step 4 - Document Results of the Eligibility Determination

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

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

C. Submittal of Notice of Intent

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

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

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

E. Services Information

United States Fish and Wildlife Service Office

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

U.S. FWS – Region 5
Supervisor

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

Natural Heritage Network

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

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

U.S. Fish and Wildlife IPaC system instructions

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

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

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

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

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

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

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

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

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

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

Attachment B

USFWS New England Ecological Services Field Office
Official Species List for the Town of Hampden
Designated MS4 Area

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-3046
Event Code: 05E1NE00-2019-E-05167
Project Name: Hampden MS4 NOI

June 24, 2019

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

To Whom It May Concern:

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

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

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

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

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

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

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

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

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

Attachment(s):

- Official Species List

Official Species List

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

This species list is provided by:

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

Project Summary

Consultation Code: 05E1NE00-2018-SLI-3046

Event Code: 05E1NE00-2019-E-05167

Project Name: Hampden MS4 NOI

Project Type: Regulation Promulgation

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

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/42.061401607852204N72.45195416165691W



Counties: Hampden, MA

Endangered Species Act Species

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

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

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

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

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

Mammals

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

Critical habitats

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

Attachment C

Federally Listed Endangered and Threatened Species in Massachusetts

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

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

Updated 02/05/2016

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

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

Updated 02/05/2016

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

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

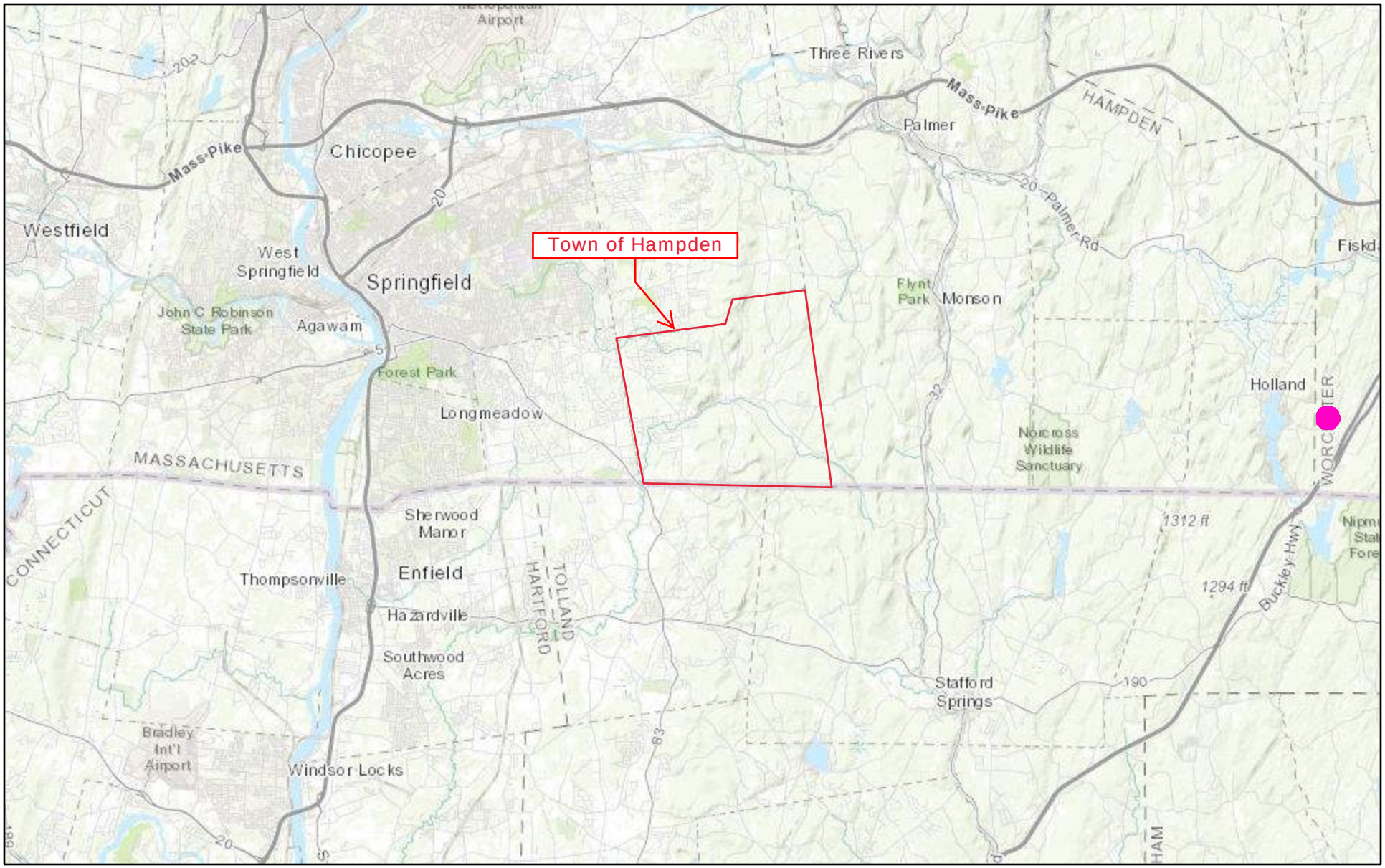
[1]Migratory only, scattered along the coast in small numbers

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

Updated 02/05/2016

Attachment D

Massachusetts Natural Heritage and Endangered Species Program (NHESP) Northern Long-eared Bat Hibernaculum Location Map and Fact Sheet


Airport
Three Rivers
Mass-Pike
HAMPDEN
Palmer
Chicopee
Mass-Pike
Westfield
West
Springfield
Springfield
Town of Hampden
20
Palmer Rd
Fiskd
Flynt
Park
Monson
John C Robinson
State Park
Agawam
Forest Park
Longmeadow
Holland
Norcross
Wildlife
Sanctuary
MASSACHUSETTS
CONNECTICUT
Sherwood
Manor
Enfield
Thompsonville
Hazardville
Southwood
Acres
TOLLAND
HARTFORD
1312 ft
1294 ft
Buckley Hwy
Stafford
Springs
190
Bradley
Int'l
Airport
Windsor Locks
83
20
32

Natural Heritage & Endangered Species Program

www.mass.gov/nhesp

Massachusetts Division of Fisheries & Wildlife

Northern Myotis
Myotis septentrionalis

State Status: **Endangered**
Federal Status: **Threatened**

DESCRIPTION: The Northern Myotis is a small bat with large ears, which when pushed forward extend at least 4 mm past its nose. Its fur and wing membranes are light brown, giving it an overall somewhat uniform brown appearance. The hairs on its back are bicolored, with a dark base and lighter tip. The Northern Myotis averages 50-95 mm in total length, with a tail of 35-42 mm. In weight, it averages 5-8 g. This bat is typically found roosting in trees and feeding in forested habitats, but may occasionally be found in human habitations.

SIMILAR SPECIES: The best diagnostic character to distinguish the Northern Myotis from other species in Massachusetts is its long ears. The rare Little Brown Myotis (*Myotis lucifugus*, Endangered) and Indiana Myotis (*Myotis sodalis*, Endangered, federally Endangered) are similar in appearance, but have shorter ears which typically do not extend beyond their nose when pushed forward. The tragus, which is a fleshy projection which sticks up in front of the ear opening, is long and narrowly pointed in the Northern Myotis, while it is shorter and blunt in the Little Brown Myotis. The Little Brown Myotis also has glossier fur and a shorter tail relative to its body length. The Indiana Myotis has a keeled calcar (a ridge of cartilage between the foot and the tail), which the Northern Myotis lacks. Other features of interest in identification include the bat's hairless interfemoral membrane (the skin stretching between the legs and tail) and lack of a black face mask (which is characteristic of Small-footed Myotis, *Myotis leibii*, Endangered).



Photo: Tammy Ciesla, MassWildlife



Distribution in Massachusetts
1987 - 2012
Based on records in the
Natural Heritage Database

HABITAT IN MASSACHUSETTS: In the warmer months, colonies of Northern Myotis may be found roosting and foraging in forested areas. Preferred roosts are in clustered stands of large trees, especially in live or dead hardwoods with large, tall cavities. These bats are found in other tree roosts as well, and occasionally in human-made structures. Northern Myotis forage under the forest canopy in structurally complex habitats, often above small ponds, vernal pools or streams, along gravel paths or roads, and at the forest edge. The bats are widespread in Massachusetts, and have been found in 11

A Species of Greatest Conservation Need in the Massachusetts State Wildlife Action Plan

Massachusetts Division of Fisheries & Wildlife

1 Rabbit Hill Rd., Westborough, MA; tel: 508-389-6300; fax: 508-389-7890; www.mass.gov/dfw

Please allow the Natural Heritage & Endangered Species Program to continue to conserve the biodiversity of Massachusetts with a contribution for 'endangered wildlife conservation' on your state income tax form, as these donations comprise a significant portion of our operating budget.
www.mass.gov/nhesp

of 14 counties. In winter, Northern Myotis hibernate in natural caves and abandoned mines, preferring habitats where the humidity is so high that water droplets sometimes cover their fur. Winter hibernacula (hibernation sites) have been reported in Berkshire, Franklin, Hampden, Middlesex, and Worcester counties.

RANGE: The Northern Myotis is found across forested parts of the eastern United States and Canada, west to British Columbia, Wyoming, and Montana, and south into Florida. It was historically common in New England, the Canadian Maritimes, Quebec and Ontario, and uncommon in the western extremes of its range.

LIFE CYCLE/BEHAVIOR: In the summer months, Northern Myotis emerge at dusk from daytime roosts for the first in a series of feeding flights. Their long tails and large wing membranes allow the bats to fly slowly and navigate through cluttered environments. These special adaptations also enable them to glean prey from foliage, in addition to catching insects on the fly. These bats locate resting insects through a combination of passive listening and the emission of high frequency echolocation calls.

Between August and October, the body weight of Northern Myotis increases by up to 45%, as they store fat for winter. In late summer, the bats begin to "swarm" around the entrances of caves, and are thought to be testing the air of possible hibernacula. This is the time when mating occurs, with females storing the sperm within their bodies until spring. By early November, the bats enter hibernation sites. Their metabolisms slow and they enter torpor, but will rouse occasionally throughout the winter to drink water. Northern Myotis share caves with a number of other species, but tend to hibernate singly or in small groups in deep cracks or crevices. They return to the same hibernacula in multiple years, but may not hibernate in the same location every year. Little data are available on migration, but the bats are known to travel up to 56 km from foraging sites to winter hibernacula.

Females bear and rear single young from mid-May through July. The longevity record for the Northern Myotis is 18 years.

POPULATION STATUS IN MASSACHUSETTS, INCLUDING THREATS: The Northern Myotis is listed as Endangered under the Massachusetts Endangered Species Act. All listed species are protected from killing, collecting, possessing, or sale and from activities that would destroy habitat and thus directly or indirectly cause mortality or disrupt critical behaviors. In addition, listed animals are specifically protected from activities that disrupt nesting, breeding, feeding, or migration.

Once a common species in the northern United States, populations of the Northern Myotis have been devastated by the spread of White-nose Syndrome. Populations in infected hibernacula in the Northeast have suffered catastrophic losses of 90-100%. White-nose Syndrome is caused by a newly described fungus, *Pseudogymnoascus destructans*, which is believed to be a non-native species accidently introduced from caves in western Europe. European species of bats have co-evolved with this fungus, so they have a high degree of immunity. The fungus grows over bats while they hibernate, causing them to rouse from dormancy frequently, lose valuable stored fat, and fail to survive the winter. The fungus is believed to be passed from cave to cave primarily by the movements of breeding male bats, but human transport is also thought to be responsible for the infection of some hibernacula.

MANAGEMENT RECOMMENDATIONS: The U.S. Fish & Wildlife Service is working in concert with government and non-profit groups to understand the spread of the fungus and potential for stopping its spread, as well as exploring opportunities for captive breeding of the most vulnerable species. Access to suitable undisturbed hibernacula is essential to the survival of the Northern Myotis, and protection of known sites is paramount. Human disturbance of hibernacula can be discouraged or prevented with the use of gated entrances, in order to avoid arousal of hibernating bats and the spread of fungal spores.

REFERENCES:

Caceres, M.C., and R.M. Barclay. 2000. Myotis septentrionalis. *Mammalian Species* 634: 1-4.

French, T.W., J.E. Cardoza, and G.S. Jones. *Homeowner's Guide to Bats*. Massachusetts Department of Fisheries & Wildlife: Westborough, MA.

Hamilton, Jr., W.J., and J.O. Whitaker, Jr. 1979. *Mammals of the Eastern United States*, Second Edition. Cornell University Press: Ithaca, NY.

U.S. Fish & Wildlife Service. 2012. "White-nose Syndrome." http://whitenosesyndrome.org/

Updated 2015

A Species of Greatest Conservation Need in the Massachusetts State Wildlife Action Plan

Please allow the Natural Heritage & Endangered Species Program to continue to conserve the biodiversity of Massachusetts with a contribution for 'endangered wildlife conservation' on your state income tax form, as these donations comprise a significant portion of our operating budget.
www.mass.gov/nhesp

Attachment E

USFWS New England Field Office "No Species Present" Letter
January 2018

United States Department of the Interior

FISH AND WILDLIFE SERVICE

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

January 31, 2019

To Whom It May Concern:

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

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

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

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

Sincerely yours,

Thomas R. Chapman
Supervisor
New England Field Office

APPENDIX D

National Historic Preservation Act Eligibility Certification

TO: Town of Hampden Stormwater Management Program Files

FROM: Tighe & Bond

COPY: Mark Langone, Highway Superintendent, Town of Hampden

DATE: September 14, 2018, updated June 24, 2019

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

Tighe & Bond followed the screening process included in Appendix D and has determined Hampden is an existing facility authorized by the previous permit and therefore meets Criterion A (see Question 1 in Appendix D of the Permit) and is not, as part of developing and submitting the Notice of Intent for permit coverage, undertaking any activity involving subsurface land disturbance less than an acre. Based on this screening process, the Town of Hampden's stormwater discharges, allowable non-stormwater discharges, and stormwater discharge-related activities will not have an effect on a property that is listed or eligible for listing on the National Register of Historic Properties (NRHP) and no further action is necessary at this time.

Attachment B to this memorandum includes a list of the federal- and state-listed historic areas, buildings, burial grounds, objects, and structures downloaded from the Massachusetts Cultural Resource Information System (MACRIS) that is current as of June 24, 2019 and a list of National Register of Historic Places listings in Hampden that is current as of April 4, 2019.

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

Attachment A

Appendix D of U.S. EPA's National Pollutant Discharge Elimination System (NPDES) General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) in Massachusetts

Appendix D
National Historic Preservation Act Guidance

Background

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

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

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

Activities with No Potential to Have an Effect on Historic Properties

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

In addition, the overwhelming majority of sources covered under this permit will be facilities that are seeking renewal of previous permit authorization. These existing dischargers should have already addressed NHPA issues in the previous general permit as they were required to certify that they were either not affecting historic properties or they had obtained written agreement from

the applicable SHPO or THPO regarding methods of mitigating potential impacts. To the extent this permit authorizes renewal of prior coverage without relevant changes in operations the discharge has no potential to have an effect on historic properties.

Activities with Potential to Have an Effect on Historic Properties

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

Examples of Control Measures Which Involve Subsurface Disturbance

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

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

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

Certification

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

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

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

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

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

Screening Process

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

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

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

NO- Go to Question 2.

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

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

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

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

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

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

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

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

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

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

Attachment B

MACRIS Database Inventoried and State-Listed Properties and Districts in the Town of Hampden and National Register of Historic Places Listings in the Town of Hampden

Massachusetts Cultural Resource Information System

MACRIS

MACRIS Search Results

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

Inv. No.	Property Name	Street	Town	Year
HMP.A	Burgess, Thornton W. House		Hampden	
HMP.B	Hampden Village		Hampden	
HMP.801	Hampden Old Cemetery	Chapin Rd	Hampden	1755
HMP.107	Morris - Cady House	19 Chapin Rd	Hampden	c 1830
HMP.108	Clark, Rev. Lucius House	25 Chapin Rd	Hampden	1830
HMP.109	Duffy - Bradway House	38 Chapin Rd	Hampden	1874
HMP.110	Lower Powers House	43 Chapin Rd	Hampden	1860
HMP.111	Upper Powers House	47 Chapin Rd	Hampden	1830
HMP.112	Cady House	59 Chapin Rd	Hampden	c 1813
HMP.113	Green, Harold House	3 Colonial Village	Hampden	1954
HMP.907	Goat Rock	Country Club Dr	Hampden	
HMP.900	Leach Monument	Main St	Hampden	1816
HMP.901	Hampden World War I Monument	Main St	Hampden	1920
HMP.902	Ravine Mill Dam	Main St	Hampden	1867
HMP.906	Hampden Village Green	Main St	Hampden	
HMP.4	Hampden Auto Body Shop	224 Main St	Hampden	
HMP.5	Casey, Mark House	303 Main St	Hampden	1988
HMP.6	Wall, Pat House	319 Main St	Hampden	c 1854
HMP.7	Noble - Harris House	337-339 Main St	Hampden	c 1860
HMP.8	Ames, Jonathan Tin Shop	340 Main St	Hampden	1888
HMP.9	Ormsby House	358 Main St	Hampden	c 1860
HMP.10	White Birch Garden Apartments	359 Main St	Hampden	1964
HMP.11	Goodwill - Brennan House	368 Main St	Hampden	c 1870
HMP.14	Cady - Vinica, Maria House	370-374 Main St	Hampden	c 1860
HMP.13	Martel - Dunlea House	371 Main St	Hampden	c 1890
HMP.15	Barnes - Casey House	390 Main St	Hampden	c 1893
HMP.16	Bresette House	397 Main St	Hampden	c 1979

Inv. No.	Property Name	Street	Town	Year
HMP.17	Vinica - Corey House	400 Main St	Hampden	c 1860
HMP.18	Mills - O'Connell House	405 Main St	Hampden	c 1860
HMP.19	Langdon - Cooney House	406 Main St	Hampden	c 1860
HMP.20	Mulrooney - Prentice House	412 Main St	Hampden	c 1855
HMP.21	Noble, LeRoy House	413 Main St	Hampden	1931
HMP.22	Smith, Lyman House	420 Main St	Hampden	c 1855
HMP.23	Vinica, Elbridge - Winslow, Lucien House	423 Main St	Hampden	1852
HMP.25	Orcutt - Battige, Charles House	428 Main St	Hampden	c 1855
HMP.26	Pease, Lora and Adella House	432 Main St	Hampden	1860
HMP.27	Beebe, Newton - Shute House	433 Main St	Hampden	c 1860
HMP.28	Beebe, Newton - Shute Barn	433 Main St	Hampden	c 1860
HMP.29	Orcutt - Brown House	437 Main St	Hampden	c 1860
HMP.31	The Fort	438 Main St	Hampden	r 1795
HMP.32	Scripter, Eleazer House	447 Main St	Hampden	1852
HMP.33	Scripter, Eleazer Barn	447 Main St	Hampden	1852
HMP.34	Sage, Luther House	453 Main St	Hampden	1852
HMP.35	Sage Barn	453 Main St	Hampden	1852
HMP.36	Stimson - Swenson House	457 Main St	Hampden	1874
HMP.37	Cunningham, Joseph House	477 Main St	Hampden	1852
HMP.38	Cunningham Barn	477 Main St	Hampden	c 1852
HMP.39	Hampden Hardware Store	478 Main St	Hampden	1961
HMP.40	Day - Fiske House	485 Main St	Hampden	1859
HMP.41	Country Auto	498 Main St	Hampden	1956
HMP.42	Union Mart	500 Main St	Hampden	1965
HMP.43	Lacowsic Woolen Mill Soaphouse	505A Main St	Hampden	1848
HMP.44	Lacowsic Woolen Mill Wool Storage Barn	505B Main St	Hampden	c 1848
HMP.45	Pease, Willie M. House	511 Main St	Hampden	c 1935
HMP.46	Green Valley Drugstore	517 Main St	Hampden	1954
HMP.47	Hampden Baptist Church	521-523 Main St	Hampden	1935
HMP.49	Village Country Kitchen	522 Main St	Hampden	1961
HMP.48	Roper's Clover Cleaning Mill	527 Main St	Hampden	r 1835
HMP.51	U. S. Post Office - Hampden Main Branch	534 Main St	Hampden	1964
HMP.50	Hatch's Store	548 Main St	Hampden	c 1828
HMP.52	Beebe, Marcus House	551 Main St	Hampden	1844
HMP.53	Adams, John Q. House	556 Main St	Hampden	1872
HMP.54	U. S. Post Office - Hampden Main Branch	561 Main St	Hampden	1955
HMP.55	Stebbins - Adams House	568 Main St	Hampden	1810
HMP.56	Pricket, Roland Art Studio	568 Main St	Hampden	c 1930

Inv. No.	Property Name	Street	Town	Year
HMP.57		570 Main St	Hampden	1955
HMP.58	Beebe, Stuart House	575 Main St	Hampden	1834
HMP.60	Newcomb - Stanton House	576 Main St	Hampden	1852
HMP.61	Bell Atlantic Telephone Office	585 Main St	Hampden	1953
HMP.62	Hampden Federated Community Church	594 Main St	Hampden	1832
HMP.63	Turner, Em House	595 Main St	Hampden	1852
HMP.64	Ballard, George House	601 Main St	Hampden	1875
HMP.65	Sessions, William J. House	612 Main St	Hampden	c 1880
HMP.66	Lyons, E. P. House	613 Main St	Hampden	1848
HMP.1	Academy Hall	616 Main St	Hampden	c 1850
HMP.68	Hunt Barn	622 Main St	Hampden	c 1880
HMP.69	Hunt - Corey House	624-626 Main St	Hampden	1907
HMP.70	Hampden Town House	625 Main St	Hampden	1932
HMP.71	Tillotson, Elizur Jr. - Thresher House	650 Main St	Hampden	1807
HMP.72	Warren, Rev. Moses - Howlett House	653 Main St	Hampden	c 1780
HMP.73	Seven Hearths	667 Main St	Hampden	c 1792
HMP.75	Thresher and Hunt Blacksmith Shop	672 Main St	Hampden	1903
HMP.76	West, Stephen Tannery	674 Main St	Hampden	1782
HMP.77	Chaffee, Edwin Marcus House	679 Main St	Hampden	1835
HMP.78	West - Thresher House	685 Main St	Hampden	c 1792
HMP.114		711 Main St	Hampden	c 1970
HMP.79	West, John - Jones House	721 Main St	Hampden	c 1847
HMP.80	West - Jones Barn	721 Main St	Hampden	c 1847
HMP.81	West - Foote House	722 Main St	Hampden	1846
HMP.82	Witkop House	749 Main St	Hampden	1945
HMP.83	Smith House	755 Main St	Hampden	1937
HMP.84	Gardner House	778 Main St	Hampden	1830
HMP.2	Burgess, Thornton W. House	789 Main St	Hampden	c 1780
HMP.3	Burgess, Thornton W. Summer Studio	789 Main St	Hampden	c 1906
HMP.87	Hampden Fire Department	19 North Rd	Hampden	1964
HMP.88	Warren, Moses H. House	20 North Rd	Hampden	c 1850
HMP.90	Fowler - Clark House	21 North Rd	Hampden	1941
HMP.91	Saxton - Bottum House	29 North Rd	Hampden	1829
HMP.92	Green Meadow School	38 North Rd	Hampden	1957
HMP.93	Sessions, Sumner House	43 North Rd	Hampden	c 1790
HMP.94	Sessions, Sumner Barn	43 North Rd	Hampden	r 1820
HMP.95	Flynn, Kathleen House	44 North Rd	Hampden	c 1986
HMP.96	Flynn, Woodie House	59 North Rd	Hampden	c 1985

Inv. No.	Property Name	Street	Town	Year
HMP.97	Burger House	69 North Rd	Hampden	c 1929
HMP.98	Mitchell House	75 North Rd	Hampden	c 1950
HMP.99	Cusson House	78 North Rd	Hampden	c 1948
HMP.100	Beebe, Steward House	85 North Rd	Hampden	c 1808
HMP.101	Dunklee House	86 North Rd	Hampden	c 1945
HMP.904	Hampden Center Dam	Riverside Dr	Hampden	r 1780
HMP.905	Flynt Park	Riverside Dr	Hampden	c 1977
HMP.104	Hampden Federated Community Church Parsonage	2 Riverside Dr	Hampden	1852
HMP.103	Chaffee - McCarthy House	10 Riverside Dr	Hampden	c 1850
HMP.102	Flynt - Smith House	32 Riverside Dr	Hampden	c 1805
HMP.85	Asher, Roy House	2 Scantic Rd	Hampden	1930
HMP.86	Griswold - Hatch House	31 Scantic Rd	Hampden	c 1850
HMP.800	Prospect Hill Cemetery	Sciantic Rd	Hampden	1876
HMP.105	West, Stephen - Hancock, John House	1 South Rd	Hampden	c 1783
HMP.106	Chaffee - Alden, Lucy Chaffee House	8 South Rd	Hampden	c 1835

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

Ref#	Property Name	Status	State	County	City	Street & Number	Listed Date	Other Names
83000740	Burgess, Thornton W., House	Listed	MASSACHUSETTS	Hampden	Hampden	789 Main St.	4/21/1983	Laughing Brook Education and Wildlife Sanctuary

Tighe&Bond

APPENDIX E

Massachusetts MS4 First-Year Stormwater Management Program (SWMP) Checklist (For Permittees Authorized Under the Previous Permit), EPA Region 1

Massachusetts MS4 First-Year Stormwater Management Program (SWMP) Checklist (For Permittees Authorized Under the Previous Permit)

The Massachusetts MS4 First-Year SWMP Checklist sets out Minimum Control Measure (MCM) elements that must be included in SWMPs by July 1, 2019 for all permittees that were covered under the previous MS4 permit. MCM incorporation deadlines for newly designated MS4s differ from MCM deadlines for MS4s authorized under the previous permit. Deadlines for newly designated permittees are set out in Section 1.10.3. Deadlines for previously authorized permittees are set out in Section 1.10.2. Use this checklist as a guide as you review and update your SWMP to address these requirements.

SMALL MS4 AUTHORIZATION

☐ Date that the NOI was submitted and the location of the NOI

☐ Date that authorization was granted and the location of the authorization letter

RECEIVING WATERS

☐ Identify all receiving waters and impairments to waterbodies

☐ Identify the number of outfalls that discharge to each waterbody segment

ELIGIBILITY DETERMINATION UNDER THE ENDANGERED SPECIES ACT (Attach and reference your NOI)

☐ Appendix C determination under the U.S. Fish and Wildlife Endangered Species Act (ESA)

☐ The Criterion used to certify ESA eligibility

☐ Additional measures required by the U.S. Fish and Wildlife Service (if any)

ELIGIBILITY DETERMINATION UNDER THE NATIONAL HISTORIC PRESERVATION ACT (NHPA)

(Attach and reference your NOI)

☐ Appendix D property screening determination

☐ The Criterion used to certify NHPA eligibility

☐ Additional documents from the State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Officer (THPO)

☐ Additional measures required by the SHPO/THPO to avoid/minimize adverse impacts (if any)

MCM 1: PUBLIC EDUCATION AND OUTREACH

☐ Identify all planned BMPs

☐ Identify the locations of applicable materials for each BMP

☐ Identify the target audience(s)

☐ Identify the measurable goals

☐ Identify the dates that message(s) are sent to each target audience

☐ Identify the responsible parties involved in ensuring the completion of the BMP

MCM 2: PUBLIC INVOLVEMENT AND PARTICIPATION

☐ The location of the SWMP for public access

☐ Provisions for public participation in SWMP development

☐ Identify any additional planned BMPs, responsible party or parties, location of the documents required to complete the BMP, and measurable goals

MCM 3: ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDDE)

☐ Reference legal authority

☐ Identify the department responsible for illicit connection enforcement

☐ Annual Sanitary Sewer Overflow (SSO) Inventory

☐ MS4 system map

☐ IDDE Program Document

☐ Outfall/interconnection inventory and ranking

☐ Employee training content and dates

MCM 4: CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

☐ Reference legal authority

☐ Site plan review procedures

☐ Procedures for site inspection and enforcement of sediment and erosion control measures

MCM 5: POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT

☐ Reference legal authority

☐ Green infrastructure report

☐ List of municipal retrofit opportunities

☐ Guidelines for street design and parking lots

MCM 6: GOOD HOUSEKEEPING AND POLLUTION PREVENTION FOR PERMITTEE-OWNED OPERATION

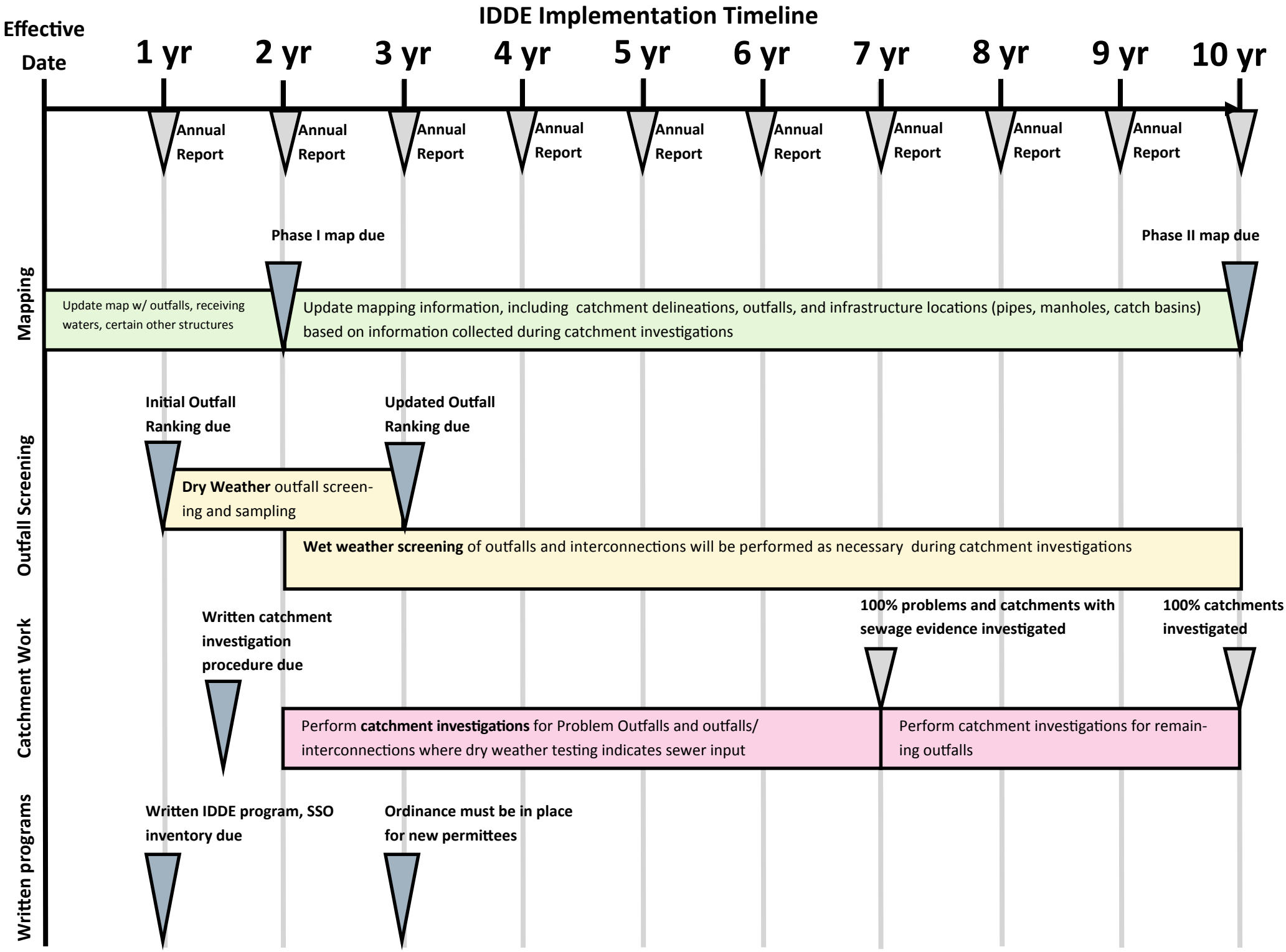
☐ Catch basin cleaning program

☐ Street sweeping program

☐ Stormwater treatment structure inspection and maintenance procedures

☐ Winter road maintenance program

Illicit Discharge Detection and Elimination Plan Implementation Timeline, EPA Region 1


IDDE Implementation Timeline
Effective Date
1 yr
2 yr
3 yr
4 yr
5 yr
6 yr
7 yr
8 yr
9 yr
10 yr
Annual Report
Phase I map due
Phase II map due
Mapping
Update map w/ outfalls, receiving waters, certain other structures
Update mapping information, including catchment delineations, outfalls, and infrastructure locations (pipes, manholes, catch basins) based on information collected during catchment investigations
Initial Outfall Ranking due
Updated Outfall Ranking due
Outfall Screening
Dry Weather outfall screening and sampling
Wet weather screening of outfalls and interconnections will be performed as necessary during catchment investigations
Written catchment investigation procedure due
100% problems and catchments with sewage evidence investigated
100% catchments investigated
Catchment Work
Perform catchment investigations for Problem Outfalls and outfalls/ interconnections where dry weather testing indicates sewer input
Perform catchment investigations for remaining outfalls
Written IDDE program, SSO inventory due
Ordinance must be in place for new permittees
Written programs

Potential Pollutants Associated with Municipal Activities, California Stormwater BMP Handbook

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

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

Potential pollutants likely associated with specific *municipal facilities*

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

Potential pollutants likely associated with *municipal activities*

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

Tips for Organizing and Conducting Volunteer Clean-up Events, Manchester Urban Ponds Restoration Program

Tips for Organizing and Conducting Volunteer Clean-up Events

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

Step 1: Plan Your Clean-Up Event



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

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



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

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



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

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

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



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

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



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

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

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

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



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

Step 2: Schedule Your Clean-Up Event

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



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

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



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

Step 3: Determine and Obtain Necessary Supplies

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



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

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

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

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

The UPRP has one First-Aid kit for use.

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



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

Step 4: Determine Your Waste Disposal Options





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

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

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



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

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

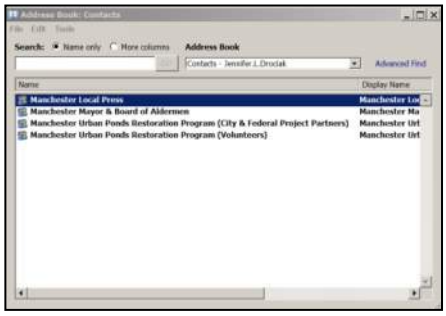


B. Determine the Best Way(s) to Advertise Your Clean-Up Event: Determine the target audience of volunteers and consider the best way(s) to advertise your clean-up event. Is it by e-mail? Website? Post-card? Posting of a flyer on a community bulletin board and / or kiosk? An annual lake association newsletter? An advertisement in a local newspaper? TV? Radio? facebook / social media? All of the above? Remember, printed materials and postage cost money, as typically do newspaper and radio advertisements. If your group has available funds for this, that is one thing. If not, instead of

simply placing a paid advertisement in a newspaper, try reaching out to a local news reporter to see if s/he will write a story about your cleanup (or write and submit an op-ed piece). This is usually good, free, advertisement. Also determine the most appropriate time to advertise for the clean-up event. Will you be advertising only once, or multiple times before the event?

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

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



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

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



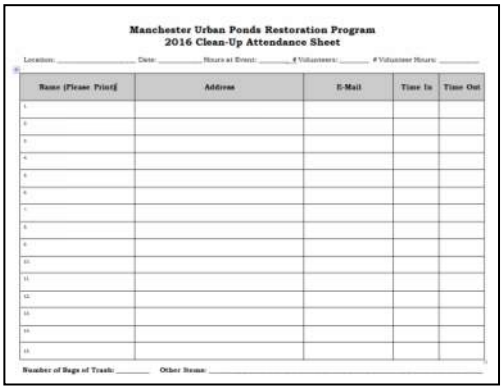
For Example: Seeking volunteers of all ages to assist in an annual trash clean-up at Black Brook and Blodget Park in Manchester on Saturday, April 23, 2016 from 9:00AM – 11:00AM. Volunteers will partner to clean the park and skirt the edges of the brook and wetland complex to remove accumulated trash.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

Step 6: Conduct Your Clean-Up Event

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

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

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



Manchester Urban Ponds Restoration Program
2016 Clean-Up Attendance Sheet

Location: _____ Date: _____ Hours at Event: _____ # Volunteers: _____ # Volunteer Hours: _____

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

Number of Bags of Trash: _____ Other Items: _____

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

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

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

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

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



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



Manchester Urban Ponds Restoration Program

Nutts Pond Facts



Manchester Urban Ponds Restoration Program

The History of Nutts Pond



Manchester Urban Ponds Restoration Program

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



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

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

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

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



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

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



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

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



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

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



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

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



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

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





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

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

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





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

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







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

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





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

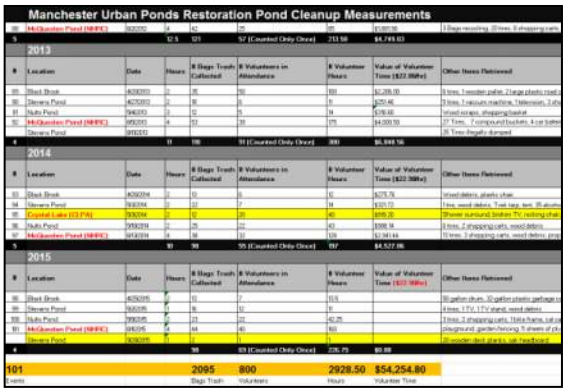
Above Right: Cake served to volunteers at the 100th official cleanup of the Manchester Urban Ponds Restoration Program .

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

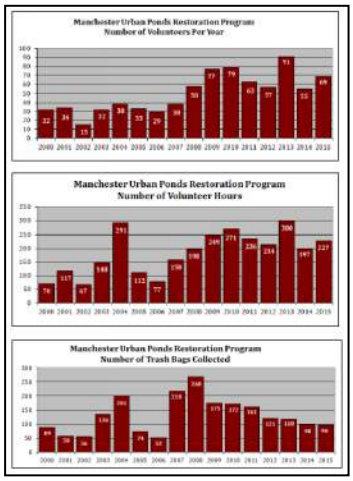
Step 7: Follow Up After the Clean-Up Event

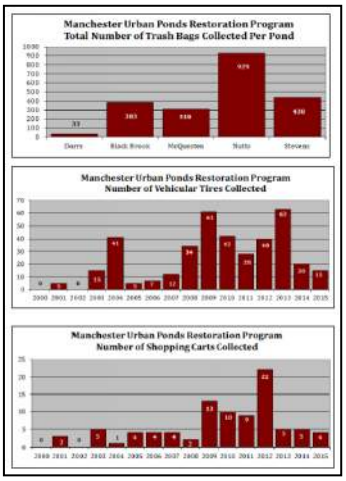
A. Update Your Electronic Records: Now is the time to transpose the information collected on the "Clean-Up Attendance Sheet" into an electronic record-retention system if you have access to one. Perhaps you have access to a database. If not, consider using a Microsoft Excel workbook / spreadsheet system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

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


Manchester Urban Ponds Restoration Pond Cleanup Measurements

#	Location	Date	Hours	# Bags Trash Collected	# Volunteers in Attendance	# Volunteer Hours	Value of Volunteer Time ($22.36/hr)	Other Items Retrieved
	2013							
	2014							
	2015							
101				2095	800	2928.50	$54,254.80	





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



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

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



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

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



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

Standard Operating Procedures for Construction Inspection, Erosion and Sedimentation Inspection, and Constructed BMP Inspection, CMRSWC

SOP 5: CONSTRUCTION SITE INSPECTION

Construction sites that lack adequate stormwater controls can contribute a significant amount of sediment to nearby bodies of water. This Standard Operating Procedure describes the major components of a municipal Stormwater Construction Inspection Plan, as well as procedures for evaluating compliance of stormwater controls at construction sites.

Stormwater Construction Inspection Plan

A stormwater Construction Site Inspection program is a program developed by municipalities to track, inspect, and enforce local stormwater requirements at construction sites.

This SOP assumes that the municipality has legal authority (i.e., a bylaw or ordinance) in place, per the requirements of the 2003 Massachusetts MS4 Permit, to require sediment and erosion control at construction sites. This legal authority must require construction site operators "to implement a sediment and erosion control program which includes [Best Management Practices] that are appropriate for the conditions at the construction site, including efforts to minimize the area of the land disturbance." The legal authority must also give inspectors the authority to enter the site.

A municipal stormwater Construction Site Inspection program should include or address the following:

1. Construction Site Inventory
    - A tracking system to inventory projects and identify sites for inspection.
    - Track the results of inspection and prioritize sites based on factors such as proximity to waterways, size, slope, and history of past violations.
2. Construction Requirements and BMPs
    - Municipalities provide contractors with guidance on the appropriate selection and design of stormwater BMPs.
3. Plan Review Procedures
    - Submitted plans must be reviewed to ensure they address local requirements and protect water quality.
4. Public Input
    - Per the 2003 Massachusetts MS4 Permit, a program must allow the public to provide comment on inspection procedures, and must consider information provided by the public.
5. Construction Site Inspections
    - Identify an inspection frequency for each site.
    - See more detailed information below.
6. Enforcement Procedures
    - A written progressive enforcement policy for the inspection program.

- Sanctions, both monetary and non-monetary, shall be utilized to ensure compliance with the program

7. Training and Education
    - Municipal staff conducting inspections should receive training on regulatory requirements, BMPs, inspections, and enforcement.

Conducting Stormwater Inspections at Construction Sites

The role of the construction inspector is to ensure that site operations match the approved site plans and the Stormwater Pollution Prevention Plan (SWPPP) for the project, and that all precautions are taken to prevent pollutants and sediment from the construction site from impacting local waterways. The inspector is also expected to determine the adequacy of construction site stormwater quality control measures.

The attached Construction Site Stormwater Inspection Report shall be used by the inspector during site visits. Construction site inspectors should abide by the following guidelines:

1. Inspections to monitor stormwater compliance should be performed at least once per month at each active construction site, with priority placed on sites that require coverage under the USEPA 2012 Construction General Permit (i.e., that disturb one or more acres), and sites that are located in the watershed of any 303(d) water bodies.
2. The inspection shall begin at a low point and work uphill, observing all discharge points and any off-site support activities.
3. Written and photographic records shall be maintained for each site visit.
4. During the inspection, the inspector should ask questions of the contractor. Understanding the selection, implementation, and maintenance of BMPs is an important goal of the inspection process, and requires site-specific input.
5. The inspector should not recommend or endorse solutions or products. The inspector may offer appropriate advice, but all decisions must be made by the contractor.
6. The inspector shall always wear personal protective equipment appropriate for the site.
7. The inspector shall abide by the contractor's site-specific safety requirements.
8. The inspector has legal authority to enter the site. However, if denied permission to enter the site, the inspector should never force entry.

Prior to planning a site visit, the inspector shall determine if the project is subject to USEPA's 2012 Construction General Permit, which is true if the the project disturbs one or more acres, total. The 2012 Construction General Permit replaces the 2008 Construction General Permit , which expired on February 15, 2012. Operators of sites that required coverage under the USEPA's 2008 Construction General Permit but continue to be active should have submitted a new Notice of Intent (NOI) under the 2012 Permit.

If the site requires this coverage, the inspector shall visit the USEPA Region 1 eNOI website (http://cfpub.epa.gov/npdes/stormwater/cgpenoi.cfm or http://cfpub.epa.gov/npdes/stormwater/noi/noisearch.cfm) to determine if the contractor filed for coverage under the 2012 and/or 2008 Construction General Permits, respectively. Print a copy of the project's NOI.

If the project disturbs one or more acres and is under construction, but does not show up in either database, the project is in violation of the Construction General Permit. Call the contractor to determine if the NOI process has been started. If not, notify the contractor verbally of this requirement and the violation. Work cannot proceed on the site until a Notice of Intent (NOI) for coverage under the 2012 Construction General Permit has been approved by USEPA. The inspector may choose to print instructions on how to file an NOI and meet with the contractor to review these. Issue a written Stop Work Order until the NOI has been approved by USEPA.

Once it has been determined that the site is in compliance with the 2012 Construction General Permit, the site inspection process can continue. The Construction Site Inspection process shall include the following:

1. Plan the inspection before visiting the construction site
    a. Obtain and review permits, site plans, previous inspection reports, and any other applicable information.
    b. Print the approved NOI from the USEPA 2012 Construction General Permit NOI website, listed previously.
    c. Inform the contractor of the planned site visit.
2. Meet with the contractor
    a. Review the Construction SWPPP (if the site includes over one acre of disturbance) or other document, as required by the municipality's legal authority. Compare BMPs in the approved site plans with those shown in the SWPPP.
    b. Review the project's approved NOI and confirm that information shown continues to be accurate.
    c. Get a general overview of the project from the contractor.
    d. Review inspections done by the contractor.
    e. Review the status of any issues or corrective actions noted in previous inspection reports.
    f. Discuss any complaints or incidents since the last meeting.
3. Inspect perimeter controls
    a. Examine perimeter controls to determine if they are adequate, properly installed, and properly maintained.
    b. For each structural BMP, check structural integrity to determine if any portion of the BMP needs to be replaced or requires maintenance.
4. Inspect slopes and temporary stockpiles
    a. Determine if sediment and erosion controls are effective.
    b. Look for slumps, rills, and tracking of stockpiled materials around the site.
5. Compare BMPs in the site plan with the construction site conditions

   a. Determine whether BMPs are in place as specified in the site plan, and if the BMPs have been adequately installed and maintained.
   b. Note any areas where additional BMPs may be needed which are not specified in the site plans.
6. Inspect site entrances/exits
   a. Determine if there has been excessive tracking of sediment from the site.
   b. Look for evidence of additional entrances/exits which are not on the site plan and are not properly stabilized.
7. Inspect sediment basins
   a. Look for signs that sediment has accumulated beyond 50% of the original capacity of the basin.
8. Inspect pollution prevention and good housekeeping practices
   a. Inspect trash areas and material storage/staging areas to ensure that materials are properly maintained and that pollutant sources are not exposed to rainfall or runoff.
   b. Inspect vehicle/equipment fueling and maintenance areas for the presence of spill control measures and for evidence of leaks or spills.
9. Inspect discharge points and downstream, off-site areas
   a. Walk down the street and/or in other directions off-site to determine if erosion and sedimentation control measures are effective in preventing off-site impacts.
   b. Inspect down-slope catch basins to determine if they are protected, and identify whether sediment buildup has occurred.
10. Meet with the contactor again prior to leaving
   a. Discuss the effectiveness of current controls and whether modifications are needed.
   b. Discuss possible violations or concerns noted during the site inspection, including discrepancies between approved site plans, the SWPPP, and/or the implementation of stormwater controls.
   c. Agree on a schedule for addressing all discrepancies, and schedule a follow-up inspection.
11. Provide a written copy of the inspection report to the contractor.
12. Follow up, as determined, and provide copy of subsequent inspection to the contractor.
13. Use Stop Work orders, as needed, until compliance with the 2012 Construction General Permit and/or other document, as required by the municipality's legal authority, can be achieved.

Attachments

1. Construction Site Stormwater Inspection Report

Related Standard Operating Procedures

1. SOP 9, Inspecting Constructed Best Management Practices

CONSTRUCTION SITE STORMWATER INSPECTION REPORT

General Information

Project Name			
Project Location			
Site Operator			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Subject to USEPA Construction General Permit? Yes ☐ No ☐ If yes, has NOI been approved? Yes ☐ No ☐ If yes, attach approved NOI to this report. **If no, contact site operator immediately to determine status of NOI.**			
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			
Describe the current phase of construction			

Site-Specific BMPs

Customize the following BMPs to be consistent with the SWPPP for the site being inspected.

	BMP Description	**Installed and Operating Properly?**	**Corrective Action Needed**
1		Yes ☐ No ☐	
2		Yes ☐ No ☐	

(continued)

	BMP Description	Installed and Operating Properly?	Corrective Action Needed
3		Yes ☐ No ☐	
4		Yes ☐ No ☐	
5		Yes ☐ No ☐	
6		Yes ☐ No ☐	
7		Yes ☐ No ☐	
8		Yes ☐ No ☐	
9		Yes ☐ No ☐	
10		Yes ☐ No ☐	
11		Yes ☐ No ☐	
12		Yes ☐ No ☐	
13		Yes ☐ No ☐	
14		Yes ☐ No ☐	
15		Yes ☐ No ☐	
16		Yes ☐ No ☐	
17		Yes ☐ No ☐	
18		Yes ☐ No ☐	
19		Yes ☐ No ☐	
20		Yes ☐ No ☐	

Erosion and Sedimentation Control

Document any of the following issues found on the construction site, and the corrective action(s) required for each.

Issue	Status	Corrective Action Needed
Have all ESC features been constructed before initiating other construction activities?	Yes ☐ No ☐	
Is the contractor inspecting and maintaining ESC devices regularly?	Yes ☐ No ☐	
Is existing vegetation maintained on the site as long as possible?	Yes ☐ No ☐	
Is construction staged so as to minimize exposed soil and disturbed areas?	Yes ☐ No ☐	
Are disturbed areas restored as soon as possible after work is completed?	Yes ☐ No ☐	
Is clean water being diverted away from the construction site?	Yes ☐ No ☐	
Are sediment traps and sediment barriers cleaned regularly?	Yes ☐ No ☐	
Are vegetated and wooded buffers protected and left undisturbed?	Yes ☐ No ☐	
Are soils stabilized by mulching and/or seeding when they are exposed for a long time?	Yes ☐ No ☐	
Has vegetation been allowed to establish itself before flows are introduced to channels?	Yes ☐ No ☐	
Is regular, light watering used for dust control?	Yes ☐ No ☐	
Is excessive soil compaction with heavy machinery avoided, to the extent possible?	Yes ☐ No ☐	

(continued)

Issue	Status	Corrective Action Needed
Are erosion control blankets used when seeding slopes?	Yes ☐ No ☐	
Are trees and vegetation that are to be retained during construction adequately protected?	Yes ☐ No ☐	
Are areas designated as off-limits to construction equipment flagged or easily distinguishable?	Yes ☐ No ☐	
If excavated topsoil has been salvaged and stockpiled for later use on the project, are stockpiles adequately protected?	Yes ☐ No ☐	
Are temporary slope drains or chutes used to transport water down steep slopes?	Yes ☐ No ☐	
Do all entrances to the storm sewer system have adequate protection?	Yes ☐ No ☐	

Overall Site Conditions

Document any of the following issues found on the construction site, and the corrective action(s) required for each.

Issue	Status	Corrective Action Needed
Are slopes and disturbed areas not being actively worked properly stabilized?	Yes ☐ No ☐	
Are material stockpiles covered or protected when not in use?	Yes ☐ No ☐	
Are natural resource areas protected with sediment barriers or other BMPs?	Yes ☐ No ☐	
Are perimeter controls and sediment barriers installed and maintained?	Yes ☐ No ☐	

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(continued)

Issue	Status	Corrective Action Needed
Are discharge points and receiving waters free of sediment deposits and turbidity?	Yes ☐ No ☐	
Are storm drain inlets properly protected?	Yes ☐ No ☐	
Is there evidence of sediment being tracked into streets?	Yes ☐ No ☐	
Is trash/litter from the construction site collected and placed in dumpsters?	Yes ☐ No ☐	
Are vehicle/equipment fueling and maintenance areas free of spills and leaks?	Yes ☐ No ☐	
Are potential stormwater contaminants protected inside or under cover?	Yes ☐ No ☐	
Is dewatering from site properly controlled?	Yes ☐ No ☐	
Are portable restroom facilities properly sited and maintained?	Yes ☐ No ☐	
Are all hazardous materials and wastes stored in accordance with local regulations?	Yes ☐ No ☐	

Non-Compliance Actions

The municipality shall provide the site operator with a copy of this report, and notice of the corrective action(s) to be taken. The site operator shall have thirty days from the receipt of the notice to commence curative action of the violation.

SOP 6: EROSION AND SEDIMENTATION CONTROL

Erosion and sedimentation from land-disturbing human activities can be a significant source of stormwater pollution. This Standard Operating Procedure describes methods for reducing or eliminating pollutant loading from such activities.

Controlling Erosion and Sediment through Design and Planning

Prevention of erosion and sedimentation is preferable to installing treatment devices. Consistent application and implementation of the following guidelines during the design and review phases can prevent erosion and sedimentation:

1. Avoid sensitive areas, steep slopes, and highly erodible soils to the maximum extent possible when developing site plans.
2. Identify potential problem areas before the site plan is finalized and approved.
3. Plan to use sediment barriers along contour lines, with a focus on areas where short-circuiting (i.e., flow around the barrier) may occur.
4. Use berms at the top of a steep slopes to divert runoff away from the slope's edge.
5. Design trapezoidal or parabolic vegetated drainage channels, not triangular.
6. Use vegetated channels with rip rap check dams, instead of impervious pavement or concrete, to reduce the water velocity of the conveyance system.
7. Design a check dam or sediment forebay with level spreader at the exit of outfalls to reduce water velocity of the discharge and collect sediment.
8. Use turf reinforcement matting to stabilize vegetated channels, encourage vegetation establishment, and withstand flow velocities without scouring the base of the channel.
9. Plan open channels to follow land contours so natural drainage is not disrupted.
10. Use organic matting for temporary slope stabilization and synthetic matting for permanent stabilization.
11. Provide a stable channel, flume, or slope drain where it is necessary to carry water down slopes.

Controlling Erosion and Sediment on Construction Sites

During the construction phase, it is important to inspect active sites regularly to ensure that practices are consistent with approved site plans and the site's Stormwater Pollution Prevention Plan (SWPPP) or other document, as required by the municipality's legal authority. The following guidelines apply:

1. Erosion and sediment control features should be constructed before initiating activities that remove vegetated cover or otherwise disturb the site. These shall be installed consistent with the approved site plans and with manufacturer's instructions.
2. Erosion and sediment control devices shall be inspected by the contractor regularly, and maintained as needed to ensure function.

3. In the SWPPP or other document, the contractor shall clearly identify the party responsible for maintaining erosion and sediment control devices.
4. An inspection should be completed of active construction sites every month, at a minimum, to check the status of erosion and sedimentation controls. Refer to SOP 5, "Construction Site Inspection", for construction site stormwater inspection procedures.
5. Existing vegetation should be maintained on site as long as possible.
6. Construction should proceed progressively on the site in order to minimize exposed soil, and disturbed areas should be restored as soon as possible after work has been completed.
7. Stockpiles shall be stabilized by seeding or mulching if they are to remain for more than two weeks.
8. Disturbed areas shall be protected from stormwater runoff by using protective Best Management Practices (BMPs).
9. Clean water shall be diverted away from disturbed areas on construction sites to prevent erosion and sedimentation.
10. Sediment traps and sediment barriers should be cleaned out regularly to reduce clogging and maintain design function.
11. Vegetated and wooded buffers shall be protected.
12. Soils shall be stabilized by mulching and/or seeding when they would be exposed for more than one week during the dry season, or more than two days during the rainy season.
13. Vegetation shall be allowed to establish before introducing flows to channels.
14. Regular light watering shall be used for dust control, as this is more effective than infrequent heavy watering.
15. Excessive soil compaction with heavy machinery shall be avoided, to the extent possible.
16. Construction activities during months with higher runoff rates shall be limited, to the extent possible.

Controlling Erosion and Sediment by Proper Maintenance of Permanent BMPs

Many construction phase BMPs can be integrated into the final site design, but ongoing inspection and maintenance are required to ensure long-term function of any permanent BMP. Refer to SOP 9, "Inspection of Constructed Best Management Practices", for more information. The following guidelines summarize the requirements for long-term maintenance of permanent BMPs.

1. Responsibility for maintaining erosion and sediment control devices shall be clearly identified.
2. Erosion and sediment control devices shall be inspected following heavy rainfall events to ensure they are working properly.
3. Erosion control blankets shall be utilized when seeding slopes.
4. Vegetated and wooded buffers shall be protected, and left undisturbed to the extent possible.
5. Runoff shall not be diverted into a sensitive area unless this has been specifically approved.
6. Sedimentation basins shall be cleaned out once sediment reaches 50% of the basin's design capacity.
7. Snow shall not be plowed into, or stored within, retention basins, rain gardens, or other BMPs.

8. Easements and service routes shall be maintained, to enable maintenance equipment to access BMPs for regular cleaning.

Related Standard Operating Procedures

1. SOP 5, Construction Site Inspection
2. SOP 9, Inspection of Constructed Best Management Practices

EROSION AND SEDIMENTATION CONTROL INSPECTION REPORT

General Information

Project Name			
Project Location			
Inspector's Name			
Site Operator			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	

Subject to USEPA Construction General Permit? Yes ☐ No ☐

If yes, has NOI been approved? Yes ☐ No ☐

If yes, attach approved NOI to this report.

If no, contact contractor immediately to determine status of NOI.

Type of Inspection:

Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐

Describe the weather conditions at time of inspection	
Describe the current phase of construction	

Erosion and Sediment Control (ESC) on Construction Sites

Document any of the following issues found on the construction site, and the corrective action(s) required for each.

Issue	Status	Corrective Action Needed
Have all ESC features been constructed before initiating other construction activities?	Yes ☐ No ☐	
Is the contractor inspecting and maintaining ESC devices regularly?	Yes ☐ No ☐	
Is existing vegetation maintained on the site as long as possible?	Yes ☐ No ☐	
Is construction staged so as to minimize exposed soil and disturbed areas?	Yes ☐ No ☐	
Are disturbed areas restored as soon as possible after work is completed?	Yes ☐ No ☐	
Is clean water being diverted away from the construction site?	Yes ☐ No ☐	
Are sediment traps and sediment barriers cleaned regularly?	Yes ☐ No ☐	
Are vegetated and wooded buffers protected and left undisturbed?	Yes ☐ No ☐	
Are soils stabilized by mulching and/or seeding when they are exposed for a long time?	Yes ☐ No ☐	
Has vegetation been allowed to establish itself before flows are introduced to channels?	Yes ☐ No ☐	
Is regular, light watering used for dust control?	Yes ☐ No ☐	
Is excessive soil compaction with heavy machinery avoided, to the extent possible?	Yes ☐ No ☐	

(continued)

Issue	Status	Corrective Action Needed
Are erosion control blankets used when seeding slopes?	Yes ☐ No ☐	
Are trees and vegetation that are to be retained during construction adequately protected?	Yes ☐ No ☐	
Are areas designated as off-limits to construction equipment flagged or easily distinguishable?	Yes ☐ No ☐	
If excavated topsoil has been salvaged and stockpiled for later use on the project, are stockpiles adequately protected?	Yes ☐ No ☐	
Are temporary slope drains or chutes used to transport water down steep slopes?	Yes ☐ No ☐	
Do all entrances to the storm sewer system have adequate protection?	Yes ☐ No ☐	

Non-Compliance Actions

The municipality shall provide the site operator with a copy of this report, and notice of the corrective action(s) to be taken. The site operator shall have thirty days from the receipt of the notice to commence curative action of the violation.

SOP 9: INSPECTING CONSTRUCTED BEST MANAGEMENT PRACTICES

Best Management Practices (BMPs) are policies, procedures and structures designed to reduce stormwater pollution, prevent contaminant discharges to natural water bodies, and reduce stormwater facility maintenance costs. Constructed BMPs are permanent site features designed to treat stormwater before infiltrating it to the subsurface or discharging it to a surface water body.

This Standard Operating Procedure provides a general summary of inspection procedures for eight common constructed BMPs, including:

1. Bioretention Areas and Rain Gardens
2. Constructed Stormwater Wetlands
3. Extended Dry Detention Basins
4. Proprietary Media Filters
5. Sand and Organic Filters
6. Wet Basins
7. Dry Wells
8. Infiltration Basins

This SOP is based on the Massachusetts Stormwater Handbook and is not intended to replace that document. This SOP is also not intended to replace the Stormwater BMP Operation and Maintenance (O&M) Plan required by the Massachusetts Wetlands Protection Act, Order of Conditions.

Bioretention Areas and Rain Gardens

Bioretention areas and rain gardens are shallow depressions filled with sandy soil, topped with a thick layer of mulch and planted with dense native vegetation. There are two types of bioretention cells:

1. Filtering bioretention area: Areas that are designed solely as an organic filter; and
2. Exfiltration bioretention area: Areas that are configured to recharge groundwater in addition to acting as a filter.

Inspection & Maintenance

Regular inspection and maintenance are important to prevent against premature failure of bioretention areas or rain gardens. Regular inspection and maintenance of pretreatment devices and bioretention cells for sediment buildup, structural damage and standing water can extend the life of the soil media.

Maintenance Schedule: Bioretention Areas and Rain Gardens

Activity	Time of Year	Frequency
Inspect for soil erosion and repair	Year round	Monthly
Inspect for invasive species and remove if present	Year round	Monthly
Remove trash	Year round	Monthly
Mulch Void Areas	Spring	Annually
Remove dead vegetation	Fall and Spring	Bi-Annually
Replace dead vegetation	Spring	Annually
Prune	Spring or Fall	Annually
Replace all media and vegetation	Late Spring/Early Summer	As Needed

When failure is discovered, excavate the bioretention area, scarify the bottom and sides, replace the filter fabric and soil, replant vegetation and mulch the surface.

Never store snow within a bioretention area or rain garden. This would prevent required water quality treatment and the recharge of groundwater.

Constructed Stormwater Wetlands

Constructed stormwater wetlands maximize the pollutant removal from stormwater through the use of wetland vegetation uptake, retention and settling. Constructed storm water wetlands must be used in conjunction with other BMPs, such as sediment forebays.

Inspection & Maintenance

Regular inspection and maintenance are important to prevent against premature failure of bioretention areas or rain gardens. Regular inspection and maintenance of pretreatment devices and bioretention cells for sediment buildup, structural damage and standing water can extend the life of the soil media.

Maintenance Schedule, Constructed Stormwater Wetlands: Years 0-3

Activity	Time of Year	Frequency
Inspect for invasive species and remove if present	Year round	Monthly
Record and Map:	Year round	Annually
Types and distribution of dominant wetland plants	Year round	Bi-Annually
Presence and distribution of planted wetland species	Spring	Annually
Presence and distribution of invasive species	Fall and Spring	Bi-Annually
Indications other species are replacing planted wetland species	Spring	Annually
Percent of standing water that is not vegetated	Spring or Fall	Annually
Replace all media and vegetation	Late Spring/Early Summer	As Needed
Stability of original depth zones and micro-topographic features		
Accumulation of sediment in the forebay and micropool and survival rate of plants		

Maintenance Schedule, Constructed Stormwater Wetlands: Years 4-Lifetime

Activity	Time of Year	Frequency
Inspect for invasive species and remove if present	Year round	Monthly
Clean forebays	Year round	Annually
Clean sediment in basin/wetland system	Year round	Once every 10 years
Mulch Void Areas	Spring	Annually
Remove dead vegetation	Fall and Spring	Bi-Annually
Replace dead vegetation	Spring	Annually
Prune	Spring or Fall	Annually
Replace all media and vegetation	Late Spring/Early Summer	As Needed

When failure is discovered, excavate the bioretention area, scarify the bottom and sides, replace the filter fabric and soil, replant vegetation and mulch the surface.

Never store snow within a constructed stormwater wetland. This would prevent required water quality treatment and the recharge of groundwater.

Extended Dry Detention Basins

Extended dry detention basins are designed to control both stormwater quantity and quality. These BMPs are designed to hold stormwater for at least 24 hours, allowing solids to settle and to reduce local and downstream flooding. Pretreatment is required to reduce the potential for overflow clogging. The

outflow may be designed as either fixed or adjustable. Additional nutrient removal may be achieved by a micropool or shallow marsh.

Inspection & Maintenance

Annual inspection of extended dry detention basins is required to ensure that the basins are operating properly. Potential problems include: erosion within the basin and banks, tree growth on the embankment, damage to the emergency spillway and sediment accumulation around the outlet. Should any of these problems be encountered, necessary repairs should be made immediately.

Maintenance Schedule: Extended Dry Detention Basins

Activity	Time of Year	Frequency
Inspect basins	Spring and Fall	Bi-Annually, and during and after major storms
Examine outlet structure for clogging or high outflow release velocities	Spring and Fall	Bi-Annually
Mow upper stage, side slopes, embankment and emergency spillway	Spring through Fall	Bi-Annually
Remove trash and debris	Spring	Bi-Annually
Remove sediment from basin	Year round	At least once every 5 years

Proprietary Media Filters

Media Filters are designed to reduce total suspended solids and other target pollutants, such as organics, heavy metals or nutrients, which are sorbed onto the filter media, which is contained in a concrete structure. The substrate used as filter media depends on the target pollutants, and may consist of leaf compost, pleated fabric, activated charcoal, perlite, amended sand in combination with perlite, and zeolite. Two types of Media Filters are manufactured: Dry Media Filters, which are designed to dewater within 72 hours; and Wet Media Filters, which maintain a permanent pool of water as part of the treatment system.

Inspection & Maintenance

Maintenance in accordance with the manufacturer's requirements is necessary to ensure stormwater treatment. Inspection or maintenance of the concrete structure may require OSHA confined space training. Dry Media Filters are required to dewater in 72 hours, thus preventing mosquito and other insect breeding. Proper maintenance is essential to prevent clogging. Wet Media Filters require tight fitting seals to keep mosquitoes and other insects from entering and breeding in the permanent pools. Required maintenance includes routine inspection and treatment.

Maintenance Schedule: Proprietary Media Filters

Activity	Time of Year	Frequency
Inspect for standing water, trash, sediment and clogging	Per manufacturer's schedule	Bi-Annually (minimum)
Remove trash and debris	N/A	Each Inspection
Examine to determine if system drains in 72 hours	Spring, after large storm	Annually
Inspect filtering media for clogging	Per manufacturer's schedule	Per manufacturer's schedule

Sand and Organic Filters

Sand and organic filters, also known as filtration basins, are intended for quality control rather than quantity control. These filters improve water quality by removing pollutants through a filtering media and settling pollutants on top of the sand bed and/or in a pretreatment basin. Pretreatment is required to prevent filter media from clogging. Runoff from the filters is typically discharged to another BMP for additional treatment.

Inspection & Maintenance

If properly maintained, sand and organic filters have a long design life. Maintenance requirements include raking the sand and removing sediment, trash and debris from the surface of the BMP. Over time, fine sediments will penetrate deep into the sand requiring replacement of several inches or the entire sand layer. Discolored sand is an indicator of the presence of fine sediments, suggesting that replacement of the sand should be completed.

Maintenance Schedule: Proprietary Media Filters

Activity	Frequency
Inspect filters and remove debris	After every major storm for the first 3 months after construction completion. Every 6 months thereafter.

Wet Basins

Wet basins are intended to treat stormwater quality through the removal of sediments and soluble pollutants. A permanent pool of water allows sediments to settle and removes the soluble pollutants, including some metals and nutrients. Additional dry storage is required to control peak discharges during large storm events, and if properly designed and maintained wet basins can add fire protection, wildlife habitat and aesthetic values to a property.

Inspection & Maintenance

To ensure proper operation, wet basin outfalls should be inspected for evidence of clogging or excessive outfall releases. Potential problems to investigate include erosion within the basin and banks, damage to the emergency spillway, tree growth on the embankment, sediment accumulation around the outlet and the emergence of invasive species. Should any of these problems be encountered, perform repairs immediately. An on-site sediment disposal area will reduce sediment removal costs.

Maintenance Schedule: Wet Basins

Activity	Time of Year	Frequency
Inspect wet basins	Spring and/or Fall	Annually (Minimum)
Mow upper stage, side slopes, embankment and emergency spillway	Spring through Fall	Bi-Annually (Minimum)
Remove sediment, trash and debris	Spring through Fall	Bi-Annually (Minimum)
Remove sediment from basin	Year round	As required, but at least once every 10 years

Dry Wells

Dry wells are used to infiltrate uncontaminated runoff. These BMPs should never be used to infiltrate stormwater or runoff that has the potential to be contaminated with sediment and other pollutants. Dry wells provide groundwater recharge and can reduce the size and cost required of downstream BMPs or storm drains. However, they are only applicable in drainage areas of less than one acre and may experience high failure rates due to clogging.

Inspection & Maintenance

Proper dry well function depends on regular inspection. Clogging has the potential to cause high failure rates. The water depth in the observation well should be measured at 24 and 48 hour intervals after a storm and the clearance rate calculated. The clearance rate is calculated by dividing the drop in water level (inches) by the time elapsed (hours).

Maintenance Schedule: Dry Wells

Activity	Frequency
Inspect dry wells	After every major storm for the first 3 months after construction completion. Annually thereafter.

Infiltration Basins

Infiltration basins are designed to contain stormwater quantity and provide groundwater recharge. Pollution prevention and pretreatment are required to ensure that contaminated stormwater is not infiltrated. Infiltration basins reduce local flooding and preserve the natural water balance of the site, however high failure rates often occur due to improper siting, inadequate pretreatment, poor design and lack of maintenance.

Inspection & Maintenance

Regular maintenance is required to prevent clogging, which results in infiltration basin failure. Clogging may be due to upland sediment erosion, excessive soil compaction or low spots. Inspections should include signs of differential settlement, cracking, erosion, leakage in the embankments, tree growth on the embankments, riprap condition, sediment accumulation and turf health.

Maintenance Schedule: Infiltration Basins

Activity	Time of Year	Frequency
Preventative maintenance	Spring and Fall	Bi-Annually
Inspection	Spring and Fall	After every major storm for the first 3 months after construction completion. Bi-annually thereafter and discharges through the high outlet orifice.
Mow/rake buffer area, side slopes and basin bottom	Spring and Fall	Bi-Annually
Remove trash, debris and organic matter	Spring and Fall	Bi-Annually

INSPECTION OF BIORETENTION AREAS / RAIN GARDENS

General Information

BMP Description	Bioretention Area / Rain Garden		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Inspect for soil erosion and repair	Monthly	Yes ☐ No ☐	
Inspect for invasive species and remove if present	Monthly	Yes ☐ No ☐	
Remove trash	Monthly	Yes ☐ No ☐	
Mulch void areas	Annually	Yes ☐ No ☐	
Remove dead vegetation	Bi-Annually	Yes ☐ No ☐	
Replace dead vegetation	Annually	Yes ☐ No ☐	
Prune	Annually	Yes ☐ No ☐	
Replace all media and vegetation	As Needed	Yes ☐ No ☐	

INSPECTION OF CONSTRUCTED STORMWATER WETLANDS
Years 0-3 of Operation

General Information

BMP Description	Constructed Stormwater Wetland		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Inspect for invasive species and remove if present	Monthly	Yes ☐ No ☐	
Replace all media and vegetation	As Needed	Yes ☐ No ☐	

In addition, the following information should be recorded and mapped at least once per year:

- Types and distribution of dominant wetland plants
- Presence and distribution of planted wetland species
- Presence and distribution of invasive species
- Indications other species are replacing planted wetland species
- Percent of standing water that is not vegetated
- Replace all media and vegetation
- Stability of original depth zones and micro-topographic features
- Accumulation of sediment in the forebay and micropool and survival rate of plants

INSPECTION OF CONSTRUCTED STORMWATER WETLANDS
Year 4 - Lifetime of Operation

General Information

BMP Description	Constructed Stormwater Wetland		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Inspect for invasive species and remove if present	Monthly	Yes ☐ No ☐	
Clean forebays	Annually	Yes ☐ No ☐	
Clean sediment in basin/wetland system	Once every 10 years	Yes ☐ No ☐	
Mulch void areas	Annually	Yes ☐ No ☐	
Remove dead vegetation	Bi-Annually	Yes ☐ No ☐	
Replace dead vegetation	Annually	Yes ☐ No ☐	
Prune	Annually	Yes ☐ No ☐	
Replace all media and vegetation	As Needed	Yes ☐ No ☐	

INSPECTION OF EXTENDED DRY DETENTION BASINS

Inspections should be conducted bi-annually, and during and after major storm events.

General Information

BMP Description	Extended Dry Detention Basin		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Examine outlet structure for clogging or high outflow release velocities	Bi-Annually	Yes ☐ No ☐	
Mow upper stage, side slopes, embankment and emergency spillway	Bi-Annually	Yes ☐ No ☐	
Remove trash and debris	Bi-Annually	Yes ☐ No ☐	
Remove sediment from basin	At least once every 5 years	Yes ☐ No ☐	

INSPECTION OF PROPRIETARY MEDIA FILTERS

General Information

BMP Description	Media Filter		
BMP Location			
Media Type			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Inspect for standing water, trash, sediment and clogging	Bi-Annually (minimum)	Yes ☐ No ☐	
Remove trash and debris	Each Inspection	Yes ☐ No ☐	
Examine to determine if system drains in 72 hours	Annually	Yes ☐ No ☐	
Inspect filtering media for clogging	Per manufacturer's schedule	Yes ☐ No ☐	

INSPECTION OF SAND AND ORGANIC FILTERS

Inspections should be conducted after every major storm event for the first 3 months following completion, then every 6 months thereafter.

General Information

BMP Description	Sand/Organic Filter		
BMP Location			
Media Type			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Remove sediment, trash, and debris	Every 6 months	Yes ☐ No ☐	
Rake sand	Every 6 months	Yes ☐ No ☐	

INSPECTION OF DRY WELLS

Regular inspections should be conducted after every major storm event for the first 3 months following completion, then annually thereafter.

General Information

BMP Description	Dry Well		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			
Describe condition of dry well at time of inspection			

After a major storm event, the water depth in the observation well should be measured at 24 and 48 hour intervals and the clearance rate calculated.

INSPECTION OF WET BASINS

Inspections should be conducted after every major storm event for the first 3 months following completion, then biannually thereafter.

General Information

BMP Description	Wet Basin		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			
Describe condition of wet basin at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Preventative maintenance	Bi-Annually	Yes ☐ No ☐	
Mow/rake buffer area, side slopes and basin bottom	Bi-Annually	Yes ☐ No ☐	
Remove trash, debris and organic matter	Bi-Annually	Yes ☐ No ☐	
Inspect and clean pretreatment devices	Every other month and after every major storm event	Yes ☐ No ☐	

INSPECTION OF OTHER BMP

General Information

BMP Description			
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
		Yes ☐ No ☐	
		Yes ☐ No ☐	
		Yes ☐ No ☐	
		Yes ☐ No ☐	
		Yes ☐ No ☐	
		Yes ☐ No ☐	
		Yes ☐ No ☐	

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APPENDIX F

Town of Hampden Stormwater System Phase 1 Map

last updated June 30, 2020

4

- 2WIDO 3HUYLHDS
- 2WIDO RQSUHGUHHW
- 6WUHDPV%DLQ
- UDLOURDGV
- UDLOLQH
- &OYHUW
- 0DZ0RU5DG
- 0DZ0RU5DG
- 6WUHDPQHWZRUN6WUHDP
- ,QWHUDFWLGLWWDWD EG
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1

1 inch = 1 mile

1

Town of Hampden Outfalls, Receiving Waters, and Impairments

last updated June 30, 2020

Summary of Hampden's TMDLs and Impaired Waters [1, 2, 3]

Receiving Waterbody	2014 Category	2014 Water Quality Impairments	2016 Category	2016 Water Quality Impairments	Applicable General Permit Section	Change to Permit Requirements
Scantic River (MA34-30)	2		5	*E. Coli*	Appendix H, Section III - Bacteria or Pathogens	Requirements of Appendix H, Section III - Bacteria or Pathogens are added
Long Island Sound TMDL for Nitrogen					Appendix F, Section B.I. - Approved Out of State TMDL for Nitrogen	None

[1] TMDLs associated with major rivers may apply to additional waterbodies within the watershed.

[2] Any TMDL or impairments related to nutrients (nitrogen and phosphorus) apply to all receiving waterbodies within the watershed.

[3] Impairments and waterbodies in blue were added in the 2016 Integrated List of Waters.

Summary of Hampden's Outfalls and Receiving Waters[1]

Tighe&Bond

Waterbody that receives flow from the MS4 and segment ID if applicable	Number of outfalls into receiving water segment	Chloride	Chlorophyll-a	Dissolved Oxygen / DO Saturation	Nitrogen	Oil & Grease / PAH	Phosphorus	Solids / TSS / Turbiditv	E. Coli	Enterococcus	Other pollutant(s) causing impairments	Notes On Revisions
South Branch Mill River	2											Added OF-151
Wetland/Tributary to South Branch Mill River	13											Removed OF-135 - culvert
Wetland/Tributary to Mill Pond	1											
Wetland/Tributary to Sawmill Brook	1											
Scantic River (MA34-30)	5								X			Added OF-154 & OF-155; added Category 5 impairment for *E. coli*
Wetland/Tributary to Scantic River	12								X			Added OF-153; added Category 5 impairment for E. coli
Watchaug Brook	0											Removed OF-30 - private
Wetland/Tributary to Watchaug Brook	7											
Isolated Wetland off of Stony Hill Road	2											Added OF-152
Isolated Wetland off of Genevieve Drive	1											
Isolated Wetland off of Circle View Drive	1											
Isolated Wetland off of Andrew Circle	2											
Outside Receiving	24											

[1] As of June 30, 2020

Town of Hampden Catchment Investigation Procedures Memorandum

Town of Hampden Catchment Investigation Procedures

TO: Town of Hampden Stormwater Management Program Files

DATE: December 2019

Background

Part 2.3.4.8 of the 2016 Small MS4 General Permit requires the Town of Hampden to develop a systematic procedure to investigate each catchment associated with an outfall or interconnection within the Town's MS4. *All* catchments must be investigated during dry weather conditions[1]. Only catchments that have a higher potential for illicit discharges based on maps, historic plans and records, and other sources of data (termed "System Vulnerability Factors" in the 2016 Small MS4 General Permit) must undergo a wet weather investigation process. The source of any illicit discharge identified during dry or wet weather must be isolated, confirmed, and removed.

The procedures presented in this memorandum were developed to address the 2016 Small MS4 General Permit requirements and describe dry and wet weather catchment investigation methodologies to isolate and confirm sources of illicit discharges. These procedures can be modified as needed by the Town to reflect local needs, staffing, and/or changes to the catchment investigation program going forward.

The Town of Hampden developed a preliminary procedure to develop the Catchment Investigations procedure described in the Illicit Discharge Detection and Elimination (IDDE) Plan included in the Stormwater Management Program (SWMP) completed in June of 2019. This memorandum is intended to update and expand upon the catchment investigations section of the IDDE Plan as required by the 2016 Small MS4 General Permit.

Identification of System Vulnerability Factors

Per part 2.3.4.8.c.i of the 2016 Small MS4 General Permit, the presence or absence of specific System Vulnerability Factors (SVFs) in Hampden must be documented. SVFs required to be assessed include:

- 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 resulting in regular surcharging, customer back-ups, or frequent customer complaints
- Areas formerly served by combined sewer systems

[1] 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.

- 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 additionally recommends assessment of the presence or absence of the following SVFs:

- 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 Town of Hampden does not have a public sewer system and therefore the SVFs that are required to be assessed are not applicable.

A desktop screening inventory was completed with input from Town staff to identify the presence or absence of SVFs in outfall catchments. The inventory assessed the presence or absence of both the required and recommended SVFs, as summarized in the table below.

SVF	Present?	Source
History of SSOs	N/A	No Town sewer
Common or twin-invert manholes serving storm and sanitary sewer	N/A	No Town sewer
Common trench construction serving both storm and sanitary sewer	N/A	No Town sewer
Sewer crossings where the sanitary sewer is above the storm drain	N/A	No Town sewer
Sanitary sewer alignments known or suspected to have been constructed with an underdrain system	N/A	No Town sewer
Inadequate sanitary sewer level of service	N/A	No Town sewer
Areas formerly served by combined sewer systems	N/A	No Town sewer
Sanitary sewer infrastructure defects	N/A	No Town sewer
SSO potential in the event of system failures	N/A	No Town sewer
Sanitary and storm drain infrastructure > 40 years old	No	No Town sewer, storm drain infrastructure is < 40 years old based on record drawings
Widespread code-required septic system upgrades indicative of poor soils or water table separation	No	Town staff, Board of Health records - no record of upgrades being concentrated in one section of Town
History of Board of Health (BOH) actions addressing widespread septic system failures	No	Town staff, Board of Health records – no record of failures being concentrated in one section of Town

Where one or more of these SVFs are present, the Town must sample and inspect the catchment area during wet weather conditions to determine whether wet weather-induced high flows in sanitary sewers or high groundwater in areas served by septic systems result in the discharge of sanitary flow to the MS4.

Manhole Inspection Methodology

Identification of Key Junction Manholes

The Town shall systematically and progressively observe, sample, and evaluate all key junction manholes to locate evidence of illicit discharges. A **junction manhole** is defined as a manhole or manhole structure with two or more inlets accepting flow from two or more MS4 alignments. **Key junction manholes** are defined as junction manholes that can represent one or more junction manholes without compromising adequate implementation of the illicit discharge program.

The following methodology will be used to identify Hampden's key junction manholes for each catchment using the Town's existing stormwater GIS mapping:

1. Identify junction manhole(s)
    a. Manholes that have at least two inlets
    b. Do not include inlets from catch basins unless the catch basins are in line
2. Identify key junction manhole(s)
    a. Based on upstream catchment areas, amount of drainage represented by a junction manhole, and implementation of the IDDE Program
    b. Assign primary and secondary key junction manholes if applicable – depending on the size of the catchment, there could be multiple junction and key junction manholes

The figures below demonstrate examples of identifying junction and key junction manholes for different drainage alignments.

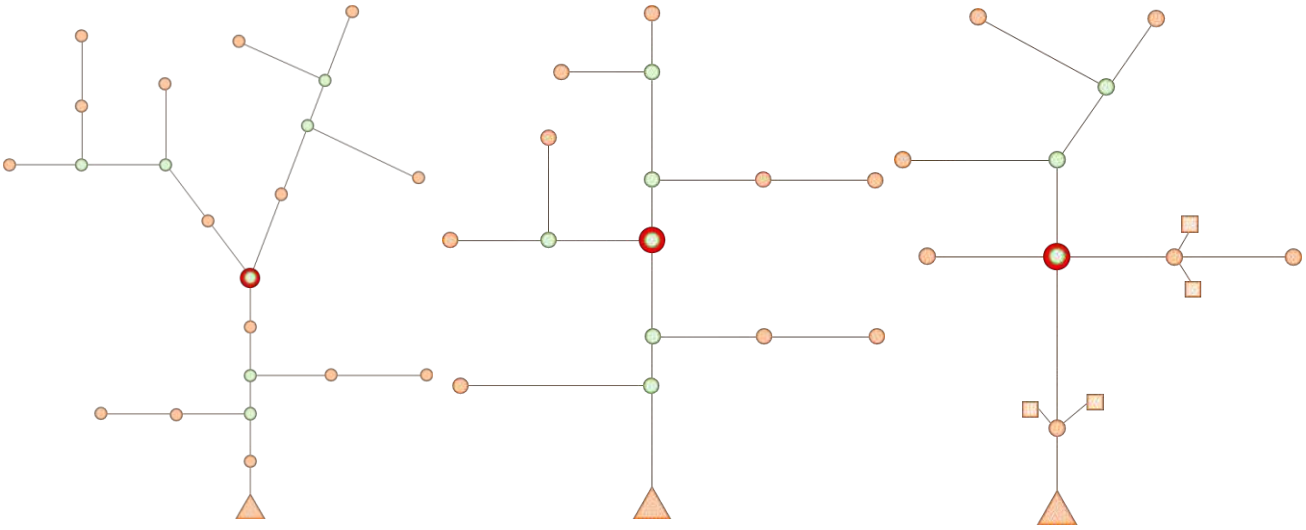


Figure 1. Examples of identification of junction and key junction manholes (adapted from the Center for Watershed Protection's *IDDE Guidance Manual*, Chapter 13: Tracking Discharges to a Source).

This analysis will be completed using Hampden's current stormwater GIS mapping and the initial catchment delineations. For catchments that have insufficient connectivity or inaccurate mapping or flow direction, identification of key junction manholes cannot occur until after the mapping is refined as part of Phase I and Phase II mapping improvements and before completing catchment investigations. Town staff and/or the Town's stormwater consultant should use the best professional judgement during investigations to determine whether additional key junction manholes should be identified and screened in the field and/or to update the Town's GIS mapping to reflect actual conditions.

If a catchment does not include a junction manhole, the dry weather screening completed at the catchment's outfall shall meet the manhole inspection requirement. If the results of the dry weather screening at the outfall indicated the potential presence of an illicit discharge, the catchment shall be further investigated until the source is identified. If the results of the dry weather screening indicated there was no flow and no evidence of illicit discharges at the outfall, and if there is no SVF for the catchment, the catchment is considered complete.

Dry Weather Investigations

All catchments must be investigated during dry weather conditions, even when no evidence of an illicit discharge is observed at the outfall. The following describes a systematic and progressive method to observe, sample, and evaluate drainage manholes during dry weather to determine the approximate location of a suspected illicit discharge.

During dry weather, key junction manholes shall be opened and inspected for visual and olfactory evidence of illicit connections. The Town shall investigate each key junction manhole within the MS4, even if no evidence of an illicit discharge is present at the outfall. If a catchment does not include a key junction manhole, investigations shall take place at a junction manhole.

The Town will begin at the most downstream key junction manhole (nearest to the outfall) and work upstream. The Town shall open key junction manholes and inspect them for visual and olfactory evidence of illicit connections.

Inspection of key junction manholes will proceed as follows:

1. Manholes will be opened and inspected for visual and olfactory evidence of illicit connections. A sample field inspection form is attached.
2. If flow is observed, a sample will be collected and analyzed at a minimum for ammonia, chlorine, and surfactants. Field kits can be used for these analyses. Additional indicator sampling may assist in determining potential sources (e.g., bacteria for sanitary flows).
3. Where sampling results or visual or olfactory evidence indicate potential illicit discharges or SSOs, the area draining to the junction manhole will be flagged for further upstream manhole investigation and/or isolation and confirmation of sources.
4. Subsequent key junction manhole inspections will proceed until the location of suspected illicit discharges or SSOs can be isolated to a pipe segment between two manholes.
5. If no evidence of an illicit discharge is found, catchment investigations will be considered complete upon completion of key junction manhole sampling.

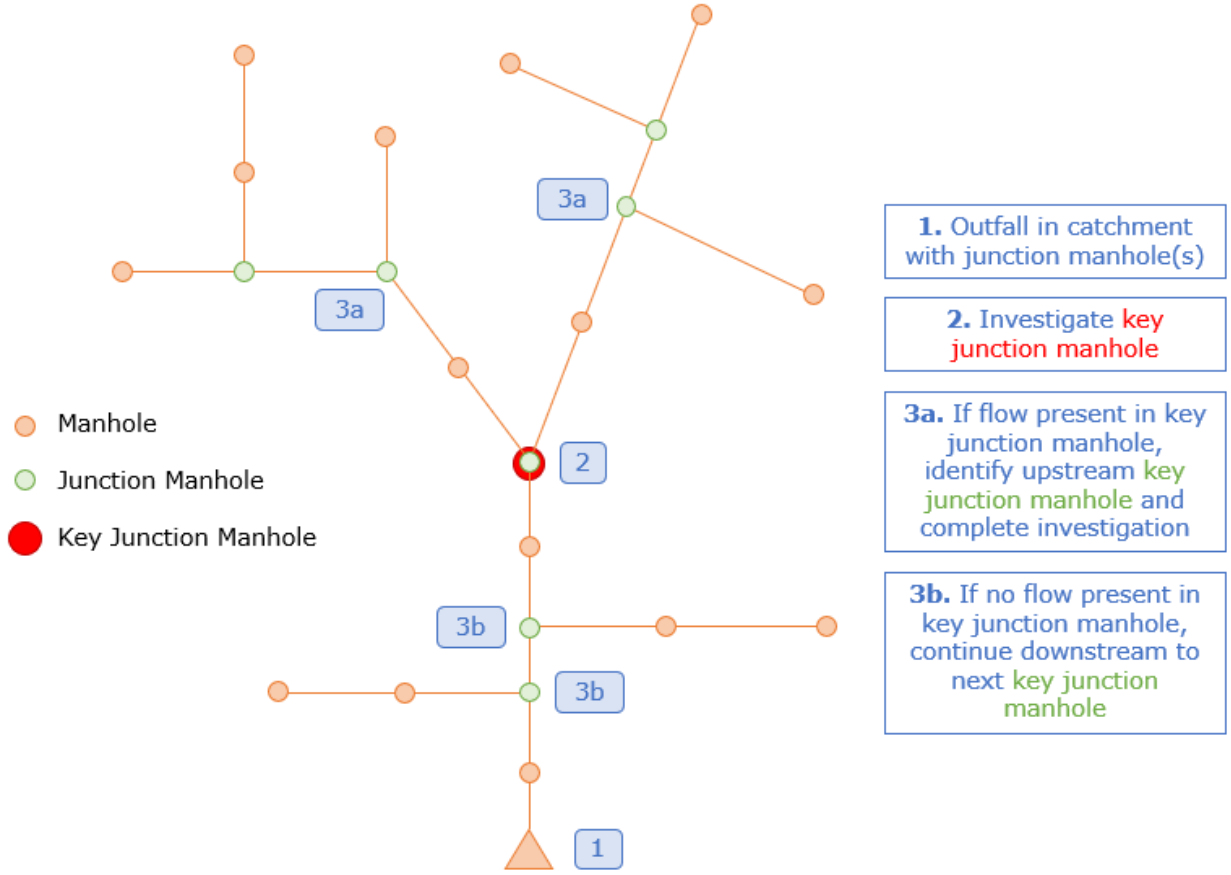


Figure 2. Example procedure for isolating illicit discharge between manholes (adapted from the Center for Watershed Protection's *IDDE Guidance Manual*, Chapter 13: Tracking Discharges to a Source).

Please refer to the attached Dry Weather Manhole Inspection and Sampling Methodology Procedure and Dry Weather Manhole Sampling Collection Field Sheet for the Town of Hampden for additional details.

Wet Weather Investigations

When one of more of the SVFs listed in Table 1 are present in a drainage catchment area, the Town must sample and inspect the associated outfall during wet weather conditions to determine whether wet weather-induced high flows in sanitary sewers or high groundwater in areas served by septic systems result in the discharge of sanitary waste flow to the MS4.

Investigations will be conducted during wet weather for catchments where one or more SVFs have been identified, per Section 2.3.4.8.c.ii.2 of the 2016 Small MS4 General Permit. The schedule to complete catchment investigations depends on the catchment priority ranking as updated after dry weather screening; however, this sampling must be completed before the catchment investigation is marked as complete. The EPA strongly recommends sampling during the spring (March through June) when groundwater levels are relatively high.

To complete wet weather sampling, the Town will follow the attached Wet Weather Outfall Sampling Procedure. The Town shall inspect and sample under wet weather conditions to the extent necessary to determine whether wet weather-induced high groundwater in areas served by septic systems result in discharges of sanitary flows to the MS4.

The 2016 Small MS4 General Permit does not specify wet weather catchment investigation procedures; however, it does require all illicit discharges to be isolated, confirmed, and removed. Investigations of catchments to identify discharges of wastewater to the MS4 can be tailored to the specific catchment, and may consist of:

- Additional visual and olfactory field observations
- Additional review of documents and reports to complete a more detailed evaluation of SVFs for the catchment (e.g., records related to infiltration/inflow programs, field inspection reports, sewer and drainage design or construction plans, institutional knowledge of historic sanitary issues, etc.)
- Additional wet weather sampling at the outfall
- Wet weather manhole inspections and sampling
- Catchment-wide investigation using CCTV/video inspection, smoke testing, and/or flooded dye testing
- Investigation of sewer collection system for evidence of surcharging or SSOs (not applicable)

Where water quality screening, sampling results, and/or visual and olfactory observations indicate a potential illicit discharge, the upstream area will be flagged for additional investigation and/or isolation and confirmation of sources. Refer to the attached Wet Weather Outfall Sampling Procedure and Wet Weather Sample Collection Field Sheet for additional information. All data collected as part of the dry and wet weather investigations shall be recorded and reported in each annual report.

Procedures to Isolate and Confirm Sources of Illicit Discharges

Once the source of an illicit discharge is approximated between two manholes, more detailed investigation techniques will be used to isolate and confirm the source of the illicit discharge. If an illicit discharge is found in a catchment and investigations to isolate and confirm the source begin, catchment investigations occurring downstream should be stopped. Once the source is confirmed and removed, downstream catchment investigations can be resumed.

The following methods may be used in isolating and confirming the source of illicit discharges:

- Sandbagging
- Smoke testing
- Dye testing
- CCTV/Video inspections
- Optical brightener monitoring

Public notification is an important aspect of a source investigation program. Prior to smoke testing, dye testing, or CCTV inspections, the Highway Department will need to notify property owners in the affected area.

Common field equipment needed for isolation and confirmation methods includes:

Maps, Documents

- Storm drain maps
- Site plan, building diagram
- Letter describing investigation
- Identification (e.g., badge or ID card)
- Pollution prevention educational materials
- Spill response agency contact information

Equipment to Find and Lift the Manhole

- Probe
- Metal detector
- Crow bar

Safety Equipment

- Hard hat
- Safety vest
- Traffic control equipment
- Gas monitor
- Eye protection
- Gloves
- Steel-toed boots
- Protective clothing

General Equipment

- Field notebook
- High powered lamps or flashlights
- Camera
- Measuring tape

As described below, each method will require additional specialized equipment, such as two-way radios, testing dye, or sandbags. The following descriptions are based on the Center for Watershed Protection's IDDE Guidance Manual, Chapter 13: Tracking Discharges to a Source.[2]

Sandbagging

This technique can be particularly useful when attempting to isolate intermittent illicit discharges or those with very little perceptible flow. The technique involves placing sandbags or similar barriers (e.g., caulking, weirs/plates, or other temporary barriers) within outlets to manholes to form a temporary dam that collects any intermittent flows that may occur.

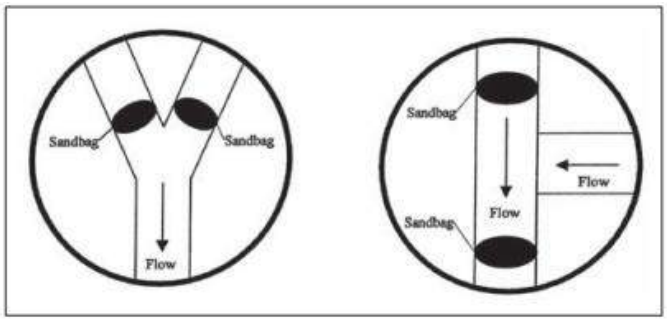


Figure 3. Example sandbag placement (from Center for Watershed Protection Center for Watershed Protection's IDDE Guidance Manual, Chapter 13: Tracking Discharges to a Source).

Sandbags are lowered on a rope through the manhole to form a dam along the bottom of the storm drain, taking care not to fully block the pipe (in case it rains before the sandbag is retrieved), as shown in Figure 3.

Sandbags should not be left in place during a heavy rainstorm. Sandbags are typically left in place for 48 hours, and should only be installed when dry weather is forecast. If flow has collected behind the sandbags/barriers after 48 hours it can be assessed using visual observations or by sampling. If no flow collects behind the sandbag, the upstream pipe network can be ruled out as a source of the intermittent discharge.

Finding appropriate durations of dry weather and the need for multiple trips to each manhole makes this method both time-consuming and somewhat limiting.

[2] https://www3.epa.gov/npdes/pubs/idde_chapter-13.pdf

Smoke Testing

Smoke testing involves injecting non-toxic smoke into drain lines and noting the emergence of smoke from sanitary sewer vents in illegally connected buildings or from cracks and leaks in the system itself. Basic equipment needed for smoke testing includes manhole safety equipment, a smoke source such as a smoke "bomb" or "candle" or liquid smoke, smoke blower, and sewer plugs. The two most common situations that indicate an illicit discharge are when smoke is seen rising from internal plumbing fixtures or from sewer vents.

Typically the storm drain is sealed off by plugging storm drain inlets, a smoke bomb or smoke generator is used to inject the smoke into the system at a catch basin or manhole, and air is then forced through the system. Test personnel are placed in areas where there are suspected illegal connections or cracks/leaks, noting any escape of smoke (indicating an illicit connection or damaged storm drain infrastructure). Only one manhole is tested at a time. Blowers should be set up next to the open manhole after the smoke is started.

The storm drain can be sealed off via sandbags lowered into place with a rope, beach balls with a diameter larger than the pipe can be placed in a mesh bag with a rope attached and lowered into the pipe, or expandable plugs can be inserted.

It is important when using this technique to make proper notifications to area residents and business owners as well as local police and fire departments. Residents should be notified at least two weeks prior to testing, and should be provided the date testing will occur, the reason for smoke testing, precautions they can take to prevent smoke from entering their residence, what they should do should smoke enter their residence, health concerns associated with the smoke, and a number residents can call to relay any particular concerns.

If the initial test of the storm drain system is unsuccessful then a more thorough smoke-test of the sanitary sewer lines can also be performed. Unlike storm drain smoke tests, buildings that do not emit smoke during sanitary sewer smoke tests may have problem connections and may also have sewer gas venting inside, which is hazardous. It should be noted that smoke may cause minor irritation of respiratory passages. Residents with respiratory conditions may need to be monitored or evacuated from the area of testing altogether to ensure safety during testing.

Dye Testing

Dye testing involves flushing non-toxic fluorescent dye into plumbing fixtures such as toilets, showers, and sinks and observing nearby storm drains and sewer manholes as well as stormwater outfalls for the presence of the dye. Similar to smoke testing, it is important to inform local residents and business owners. Police, fire, and local public health staff should also be notified prior to testing in preparation of responding to citizen phone calls concerning the dye and their presence in local surface waters.

A team of two or more people is needed to perform dye testing (ideally, all with two-way radios). One person is inside the building, while the others are stationed at the appropriate storm sewer and sanitary sewer manholes (which should be opened) and/or outfalls. The person inside the building adds dye into a plumbing fixture (i.e., toilet or sink) and runs a sufficient amount of water to move the dye through the plumbing system. The person inside the building then radios to the outside crew that the dye has been dropped, and the outside crew watches for the dye in the storm sewer and sanitary sewer, recording the presence or absence of the dye.

In most cases, liquid dye is used, although solid dye tablets can also be placed in a mesh bag and lowered into the manhole on a rope, or dye strips, powder, wax cakes, or donuts can be used. Green and liquid dyes are the easiest to see, but test strips can be a good alternative for residential or commercial applications where potential permanent staining from the dye is a concern. Multiple colors of dye should be used when testing multiple fixtures.

Pick the closest manhole possible to make observations, typically a sewer lateral; if this is not possible, make observations at the nearest downstream manhole. The investigation is not complete until the dye is found; if the dye is missing, it is possible that the building is actually connected to a septic system instead of the sewer system, the sewer line is clogged, or there is a leak.

The test can be relatively quick (about 30 minutes per test), effective (results are usually definitive), and inexpensive. Dye testing is best used when the likely source of an illicit discharge has been narrowed down to a few specific houses or businesses.

CCTV/Video Inspections

Another method of source isolation involves the use of mobile video cameras that are guided remotely through stormwater drain lines to observe possible illicit discharges. IDDE program staff can review the videos and note any visible illicit discharges. Prior to video inspections, the field crew should review storm drain maps and, if possible, visit the site to help determine the size of camera needed and whether the storm drain has standing water.

Video testing requires a Closed-Circuit Television (CCTV) camera, which can be self-propelled or towed. Many commercially available camera systems are adapted to televise storm sewers or sanitary sewers. The camera should be capable of radial view and able to swivel both horizontally and vertically, should be in color, and lighting should be supplied by a lamp on the camera. If the storm drain has ponded water, the camera should be attached to a raft.

Video testing is useful when access to properties is constrained, but will not test all types of discharges. While this tool is both effective and usually definitive, it can be costly and time consuming when compared to other source isolation techniques.

Optical Brightener Monitoring

Optical brighteners are fluorescent dyes that are used in detergents and paper products to enhance their appearance. The presence of optical brighteners in surface waters or dry weather discharges suggests there is a possible illicit discharge or insufficient removal through adsorption in nearby septic systems or wastewater treatment.

Optical brightener monitoring (OBM) can be done in two ways. The most common, and least expensive, methodology involves placing a cotton pad in a wire cage and securing it in a pipe, manhole, catch basin, or inlet to capture intermittent dry weather flows (known as an OBM trap). The pad is retrieved at a later date and placed under UV light to determine the presence/absence of brighteners during the monitoring period. This method is most reliable for undiluted washwaters.

A second methodology uses handheld fluorometers to detect optical brighteners in water sample collected from outfalls or ambient surface waters. Use of a fluorometer, while more quantitative, is typically more costly and is not as effective at isolating intermittent discharges as other source isolation techniques.

Schedule

Catchment investigations must be completed in accordance with the schedule in the Permit, as summarized below:

- Investigations of catchments associated with Problem Outfalls shall begin in Permit Year 2 (i.e., prior to June 30, 2020) and be completed by the end of Permit Year 7 (i.e., June 30, 2025) – there are no Problem Outfalls currently identified in Town.
- Investigations of catchments associated with High and Low Priority Outfalls shall follow the completion of dry weather screening and re-ranking of outfalls and be completed by the end of Permit Year 10 (i.e., June 30, 2028).

Where information gathered on an outfall/interconnection during dry weather screening identifies a likely sewer input, investigations of the associated catchment shall be completed by the end of Permit Year 7 (i.e., June 30, 2025).

Attachments

Attachment 1 - System Vulnerability Factors Analysis

Attachment 2A - Dry Weather Manhole Inspection and Sampling Methodology

Attachment 2B - Dry Weather Manhole Sample Collection Field Sheet

Attachment 3A - Wet Weather Outfall Sampling Procedure

Attachment 3B - Wet Weather Outfall Sample Collection Field Sheet

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Outfall ID	Receiving Water	History of SSOs	Common or Twin Invert Manholes	Common Trench Construction	Storm / Sanitary Sewer Crossings (Sanitary Above)	Sanitary Lines with Underdrains	Inadequate Sanitary Level of Service	Areas Formerly Served by Combined Sewers	Sanitary Infrastructure Defects	SSO Potential in the Event of System Failures	Sanitary and Storm Drain Infrastructure > 40 Years Old	Septic with Poor Soils or Water Table Separation	History of BoH Actions Addressing Septic Failure
1_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
2_OF	Watchaug Brook	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
3_OF	Wetland to Tributary to Watchaug Brook	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
4_OF	Isolated Wetland off of Andrew Circle	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
5_OF	Isolated Wetland off of Andrew Circle	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
6_OF	Wetland to Mill Pond	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
7_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
8_OF	Isolated Wetland off of Circle View Drive	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
9_OF	Wetland to Tributary to South Branch Mill River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
10_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
11_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
12_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
13_OF	Tributary to South Branch Mill River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
14_OF	Tributary to Wetland to Scantic River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
15_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
16_OF	Wetland to Tributary to South Branch Mill River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
17_OF	Wetland to Tributary to South Branch Mill River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
18_OF	Wetland to Tributary to South Branch Mill River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
19_OF	Tributary to Wetland to Scantic River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
20_OF	Tributary to Wetland to Scantic River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
21_OF	Wetland to Scantic River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
22_OF	Wetland to Tributary to South Branch Mill River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
23_OF	Wetland to Tributary to Watchaug Brook	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
24_OF	Tributary to Wetland to Watchaug Brook	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
25_OF	Tributary to Wetland to Scantic River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
26_OF	Scantic River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
27_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
28_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
29_OF	Tributary to Wetland to South Branch Mill River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
30_OF	Wetland to Tributary to Watchaug Brook	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
74_OF	Isolated Wetland off of Stony Hill Road	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
75_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
76_OF	Wetland to South Branch Mill River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
77_OF	South Branch Mill River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
78_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
79_OF	Wetland to South Branch Mill River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
80_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
81_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
82_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
83_OF	Tributary to South Branch Mill River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
84_OF	Tributary to South Branch Mill River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
87_OF	Tributary to South Branch Mill River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
88_OF	Tributary to Sawmill Brook	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
89_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
91_OF	Tributary to Watchaug Brook	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
92_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
93_OF	Tributary to Wetland to Watchaug Brook	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
94_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
95_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
96_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
97_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
98_OF	Scantic River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
99_OF	Tributary to Wetland to Scantic River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
103_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
104_OF	Isolated Wetland off of Genevieve Drive	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
105_OF	Tributary to Wetland to Scantic River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
106_OF	Wetland to Scantic River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
107_OF	Wetland to Tributary to Watchaug Brook	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
108_OF	Tributary to Wetland to Scantic River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
109_OF	Wetland to Tributary to Scantic River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
110_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
120_OF	Tributary to South Branch Mill River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
121_OF	Tributary to South Branch Mill River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
122_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
123_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
124_OF	Outside Receiving	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
125_OF	Tributary to Scantic River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No
126_OF	Scantic River	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No

Dry Weather Manhole Inspection and Sampling Methodology

The following document establishes procedures for use of field kits and field data collection for dry weather sampling of manholes in the Town of Hampden, MA as part of the Catchment Investigation Procedures developed in accordance with section 2.3.4.8.b. of the EPA NPDES General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) in Massachusetts (General Permit).

1) Field work shall proceed only under dry weather conditions (when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period). Document source used to determine dry weather conditions (e.g., www.wunderground.com, www.cocorahs.org) on the attached Dry Weather Sampling Field Sheet.

2) Notify the Town of Hampden of sampling schedule prior to going into the field:

    a. Mark Langone, Hampden Highway Superintendent: (413) 566-8842, hampden@highwayma.gov

    b. Hampden Police Department: (413) 566-8011, contact@hampdenpolice.com

3) Locate the catchment's key junction manhole[1] (nearest to outfall) and protect the area using traffic cones or a Town vehicle with lights.

4) Open the manhole and inspect it for visual evidence (e.g., waste, toilet paper, gray bacterial growth, or the presence of sanitary products) and olfactory evidence of illicit discharge/connections.

5) If dry weather flow is present, complete in-situ screening of flow using test kits.

    a. Using a sampling bottle or cup, collect the flow with care to not disturb sediment materials or collect surface debris/scum as best possible. Use sampling pole if needed to safely reach the flow.

    b. The collected water will be poured into **surfactants** test tube, **chlorine** sample cell, and the remainder will be tested for **ammonia** with test strips. Follow the manufacturer instructions for all test kit procedures. All waste from the field test kits should be retained and disposed of according to manufacturer instructions.

6) If dry weather flow is present but there is not enough flow to sample or if dry weather flow is not present but there is visual or olfactory evidence of an illicit discharge, complete one of the following:

    a. Dam the manhole and return within 24 hours to sample the discharge that has built up behind the dam;

    b. Complete an inspection at the next upstream structure to isolate the source; or

    c. Return to and reinspect the manhole within one week and sample if flow is then present.

7) If the manhole is submerged due to downstream water levels or clogged pipes, or is otherwise inaccessible, proceed to the next upstream junction manhole to complete the inspection and screening. Notify the Highway Department of any maintenance issues requiring attention.

[1] Key junction/junction manholes can also be catch basins. For the purpose of this Methodology, "manhole" includes both drainage structures.

8) Threshold Levels: In-situ readings will be compared to field thresholds as follows:

Parameter	Threshold Level	Source
Surfactants	≥ 0.25 mg/L	EPA New England Bacterial Source Tracking Protocol
Ammonia	≥ 0.5 mg/L	EPA New England Bacterial Source Tracking Protocol
Chlorine	≥ 0.02 mg/L	EPA 2016 General Permit

9) Record Results: Fill in all form fields for sampling data, threshold exceedances, and visual/olfactory observations.

10) If the in-situ readings, visual evidence, or olfactory evidence indicate an illicit discharge, continue upstream to the next key junction manhole and repeat the inspection and screening process. Manhole investigations will proceed at key junction and junction manholes until the location of the suspected illicit discharge or SSO can be isolated to a pipe segment between two manholes.

11) If dry weather flow is not present and there is no visual or olfactory evidence of illicit discharge at all key junction manholes in the catchment, the catchment investigation is considered complete. All key junction manholes in a catchment must be screened in order for the catchment investigation to be considered complete.

12) Equipment/Items Needed

Field Equipment	Paperwork	Personal Gear
❑ Sampling pole	❑ Signed Site Safety Plan	❑ Steel-toed boots
❑ Carry caddy	❑ Field sheets	❑ Safety goggles
❑ Digital camera or iPad	❑ Field maps	❑ Reflective safety vest
❑ First aid kit	❑ Key junction manhole locations map	❑ Insect repellent
❑ Surfactants test kit and glass container for liquid waste to be disposed of as hazardous waste	❑ Center for Watershed Protection, IDDE Guidance Manual, Chapter 13	❑ Sunscreen
❑ Ammonia test kit and glass container for ampules to be disposed of as hazardous waste		❑ Business cards
❑ Chlorine test kit and glass container for chloride kit liquid waste to be diluted and disposed of down sink		
❑ Flashlight or head lamp		
❑ Nitrile gloves		
❑ Tape measure		
❑ 1 liter bottle		
❑ Duct tape		
❑ Sharpies		
❑ Paper towels		
❑ Trash bags		

Town of Hampden, MA

DRY WEATHER MANHOLE SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

SUBWATERSHED:	**OUTFALL ID:**	**MANHOLE LOCATION:**
TODAY'S DATE:	**TIME:**	
INVESTIGATORS:		
TEMPERATURE (°F):	**RAINFALL (IN.):** **LAST 72 HOURS:**	**LAST 24 HOURS:**

Section 2: Manhole Description

MAINTENANCE NEEDS	☐ Pipe blockage ☐ Structure damage/corrosion ☐ Yard Waste ☐ Pet Waste ☐ Other:
INVERTS SUBMERGED?	☐ No ☐ Partially ☐ Fully If yes, which pipe?
FLOW PRESENT?	☐ Yes ☐ No
FLOW DESCRIPTION (IF PRESENT)	☐ Trickle ☐ Moderate ☐ Substantial
FLOW SOURCE (IF PRESENT)	Description or sketch:
INTERMITTENT FLOW TRAP (E.G., SANDBAG) RECOMMENDED?	☐ Yes ☐ No

Section 3: Quantitative Characterization

FIELD DATA			
PARAMETER (THRESHOLD LEVEL)	**RESULT**	**UNIT**	**EQUIPMENT**
SURFACTANTS (≥ 0.25 mg/L)		mg/L	MBAS Test Kit (CHEMetrics K-9400)
AMMONIA (NH3) (≥ 0.5 mg/L)		mg/L	Test Strips
CHLORINE (≥ 0.02mg/L)		mg/L	Hach Pocket Colorimeter

Section 4: Physical Indicators in the Flow

INDICATOR	CHECK IF PRESENT	DESCRIPTION
ODOR	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Soap/laundry ☐ Sulfide ☐ Other:
FLOATABLES (DOES NOT INCLUDE TRASH)	☐	☐ Sewage (toilet paper, etc.) ☐ Suds/soap ☐ Gray bacterial growth ☐ Sanitary products ☐ Food ☐ Other:

Section 5: Data Collection

SAMPLE COLLECTED FOR LAB ANALYSIS?	☐ No ☐ Yes – E. coli

Section 6: Notes

Wet Weather Outfall Sampling Procedure

The following document establishes procedures for wet weather outfall sampling in the Town of Hampden, MA as part of the Catchment Investigation Procedures developed in accordance with section 2.3.4.8.b. of the EPA NPDES General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) in Massachusetts (General Permit).

1) For all catchments with a minimum of one (1) System Vulnerability Factor identified, the Town of Hampden shall inspect and sample under wet weather conditions to the extent necessary to determine whether wet weather-induced high groundwater in areas served by septic systems result in discharges of sanitary flow to the MS4.
2) Definition of wet weather: A storm is considered a representative wet weather event if there is a rainfall event sufficient to produce a stormwater discharge and occurs at least 72 hours after the previously measurable (greater than 0.1 inch of rainfall) storm event.
    - Weather Underground (https://www.wunderground.com) or the Community Collaborative Rain, Hail, & Snow Network (https://www.cocorahs.org) can be used to determine the previous rainfall event time and amount.
    - For ease of coordination of personnel and equipment, it is preferable to plan for wet weather sampling when the forecast likelihood of rainfall is 60% or higher.
    - In general, a minimum of 0.25 inches of rain in the previous 24 hour period is preferred.
    - The drain system must be actively flowing at the time of sampling.
    - Sampling during periods of medium to high intensity rainfall/storm drain discharge is preferred.
    - Avoid sampling during the "first flush," or the initial surface runoff from a rainstorm.
3) Review supplies of sampling bottles and test kits on a weekly basis and order as necessary for field sampling activities.
4) Notify the Town of Hampden of sampling schedule prior to going into the field:
    a. Mark Langone, Hampden Highway Superintendent: (413) 566-8842, hampden@highwayma.gov
    b. Hampden Police Department: (413) 566-8011, contact@hampdenpolice.com
5) The attached Wet Weather Outfall Inspection and Sample Collection Form should be used to document observations related to the quality of stormwater conveyed by the structure.
6) Observations of an **oil sheen**, **discoloration**, and/or **trash and debris** can indicate sources of pollution within the storm drain system.

    For any visual observation of pollution in a stormwater outfall discharge, an investigation into the pollution source should occur, but the following are often true:

    - Foam: indicator of upstream vehicle washing activities, or an illicit discharge.
    - Oil sheen: result of a leak or spill.
    - Cloudiness: indicator of suspended solids such as dust, ash, powdered chemicals and ground up materials.
    - Color or odor: Indicator of raw materials, chemicals, or sewage.
    - Excessive sediment: indicator of disturbed earth of other unpaved areas lacking adequate erosion control measures.

- Sanitary waste and optical enhancers (fluorescent dyes added to laundry detergent): indicators of illicit discharge.
- Orange staining: indicator of high mineral concentrations.

Many of these observations are indicators of an illicit discharge, but several of these indicators may also occur naturally. Orange staining may be the result of naturally occurring iron, and thus unrelated to pollution.

Foam can be formed when the physical characteristics of water are altered by the presence of organic materials. Foam is typically found in waters with high organic content such as bog lakes, streams that originate from bog lakes, productive lakes, wetlands, or woody areas. To determine the difference between natural foam and foam caused by pollution, consider the following:

- Wind direction or turbulence: often, foam can be found along a shoreline and/or on open waters during windy days. Natural occurrences in rivers can be found downstream of a turbulent site.
- Proximity to a potential pollution source: some entities including the textile industry, paper production facilities, oil industries, and fire fighting activities work with materials that cause foaming in water. If these materials are released to a water body in large quantities, they can cause foaming. Also, the presence of silt in water, such as from a construction site can cause foam.
- Feeling: natural foam is typically persistent, light, not slimy to the touch.
- Presence of decomposing plants or organic material in the water.

Both bacteria and petroleum can create a sheen on the water surface. The source of the sheen can be differentiated by disturbing it, such as with a pole. A sheen caused by oil will remain intact and move in a swirl pattern; a sheen caused by bacteria will separate and appear "blocky". Bacterial or naturally occurring sheens are usually silver or relatively dull in color and will break up into a number of small patches of sheen. The cause may be presence of iron, decomposition of organic material or presence of certain bacteria. Bacterial sheen is not a pollutant but should be noted.

7) The Wet Weather Outfall Inspection and Sample Collection Form includes fields where these and other specific observations can be noted. The inspector shall indicate the presence of a specific water quality indicator or parameter by marking "Yes". If "Yes" is marked, provide additional details in the comments section. If the indictor in question is not present mark "No".

8) In-Situ Screening and Field Parameter Collection:
   - Sample storm drain outfalls as close to the outfall opening as possible, wearing a fresh pair of disposable gloves.
   - If the outfall is submerged, sampling should be completed at the first accessible upstream structure that is not submerged. Note the location on the form.

9) Complete in-situ screening of flow using **test kits**:
   - Using a sampling bottle or cup, collect the flow with care to not disturb sediment materials or collect surface debris/scum as best possible. Use sampling pole if needed to safely reach the flow.
   - The collected water will be poured into **surfactants** test tube, **chlorine** sample cell, and the remainder will be tested for **ammonia** with test strips. Follow the

manufacturer instructions for all test kit procedures. All waste from the field test kits should be retained and disposed of according to manufacturer instructions.

10) Meters: A properly calibrated meter should be used to record the following parameters directly from the outfall:
    - Conductivity
    - Salinity
    - Temperature
11) Threshold Levels: in-situ readings will be compared to field thresholds as follows:

Parameter	Threshold Level	Source
Surfactants	≥ 0.25 mg/L	EPA New England Bacterial Source Tracking Protocol
Ammonia	≥ 0.5 mg/L	EPA New England Bacterial Source Tracking Protocol
Chlorine	≥ 0.02 mg/L	EPA 2016 General Permit
Conductivity	> 2,000 µS/cm	Center for Watershed Protection
Temperature	> 83 °F	314 CMR 4.00 for Class B Warm Water
Salinity	> 0.5 ppt Rivers	EPA Voluntary Estuary Monitoring Manual

12) When flow volume or depth is insufficient to immerse the meter probe, a clean sample bottle may be used to collect a sufficient volume of water to immerse the probe. In such instances, meter readings should be taken immediately.

13) Analytical Sample Collection: Sample collection methods shall follow test procedures outlined in 40 CFR 136. A discrete grab sample can classify water at a distinct point in time. These samples are easily collected and used primarily when the water quality of the discharge is expected to be homogeneous, or unchanging, in nature.

14) Protocols for collecting a grab sample shall include the following:
    - Do not eat, drink or smoke during sample collection and processing.
    - Do not collect or process samples near a running vehicle.
    - Do not park vehicles in the immediate sample collection area, including both running and non-running vehicles.
    - Always wear clean, powder-free nitrile gloves when handling sample containers and lids.
    - Never touch the inside surface of a sample container or lid, even with gloved hands.
    - Never allow the inner surface of a sample container or lid to be contacted by any material other than the sample water.
    - Collect samples while facing upstream and so as not to disturb water or sediments in the outfall pipe.
    - Do not overfill sample containers, and do not dump out any liquid in them. Liquids are often added to sample containers intentionally by the analytical laboratory as a preservative or for pH adjustment.
    - Do not allow any object or material to fall into or contact the collected water sample.

- Do not allow rainwater to drip from rain gear or other surfaces into sample containers.
- Replace and tighten sample container lids immediately after sample collection.
- Accurately label the sample with the time and location.

15) Document on the Wet Weather Outfall Inspection and Sample Collection Form that analytical samples were collected, specify parameters, and note the sample time on the Form. This creates a reference point for samples.

16) Water quality samples will be taken for laboratory analysis according to the following table. Each bottle will be marked with time, date, and outfall identifier, and parameter to be analyzed.

All Outfalls	EPA Approved Method for Analysis	Impaired Waterbodies in Hampden[1]
E. coli samples should be collected first, in a separate sterile sample bottle.	E. coli: 1603 (preferred); 1103.1; Colilert 12® 16; Colilert-18® 12 15 16; mColiBlue-24® 17	None
Total Nitrogen (Long Island Sound TMDL)	Nitrogen (Total): 351.1/351.2 + 353.2	
[1] Table is based on the most recent approved Massachusetts Integrated List of Waters (2014), and will need to be updated when new Massachusetts Integrated Lists of Waters are finalized.		

17) Results should be recorded, custody forms completed, and samples placed in a cooler on ice. If using an iPad, fill in all form fields for sampling data, check parameter analysis box if a threshold was exceeded, and check outfall completed box when done. **Make note of the first bacteria sample time for determining the hold limit until lab analysis.**

18) Be sure to upload all data entry before leaving the site. If there is any doubt whether data was captured, duplicate information on paper forms.

19) Upon completion of sampling and return to the laboratory, all samples will be turned over to the appropriate sample custodian(s) and accompanied by an appropriate Chain-of-Custody form.

20) Equipment/Items Needed

Field Equipment	Paperwork	Personal Gear
❑ Sample bottles and holding time and storage requirements (from lab)	❑ Signed Site Safety Plan	❑ Waders or other appropriate footwear (steel-toed boots if opening manholes)
❑ Extra sample bottles in case of contamination, cracking, or loss	❑ Sampling plan and locations	❑ Safety goggles
❑ Cooler with ice	❑ Field sheets	❑ Reflective safety vest
❑ Digital camera or iPad	❑ Field maps	❑ Insect repellent
❑ Flashlight or head lamp	❑ Chain of Custody form, filled out	❑ Sunscreen
❑ Nitrile gloves	❑ Bottle labels in Ziploc bag	❑ Business cards
❑ Tape measure	❑ Center for Watershed Protection, IDDE Guidance Manual, Chapters 11 & 13	❑ Light colored long-sleeved shirts and pants
❑ Sampling pole		❑ Rain gear
❑ First aid kit		
❑ Tape measure		
❑ Water quality meter(s)		
❑ Watch with a second hand		
❑ Carry caddy		
❑ Surfactants test kit and glass container for liquid waste to be disposed of as hazardous waste		
❑ Ammonia test kit and glass container for ampules to be disposed of as hazardous waste		
❑ Chlorine test kit and glass container for chloride kit liquid waste to be diluted and disposed of down sink		
❑ 1 liter bottle		
❑ Duct tape		
❑ Sharpies		
❑ Paper towels		
❑ Trash bags		

Town of Hampden, MA

WET WEATHER OUTFALL SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

SUBWATERSHED:	**OUTFALL ID:**	**LOCATION:**
TODAY'S DATE:	**TIME:**	
INVESTIGATOR(S):		
TEMPERATURE (°F):	**RAINFALL (IN.) - LAST 72 HOURS:**	**LAST 24 HOURS:**

Section 2: Visual Inspection of Outfall/Pool

VISUAL INSPECTION	PRESENT?	DESCRIPTIONS
MAINTENANCE NEEDS	☐ Yes ☐ No	☐ Cracked ☐ Crushed ☐ Clogged with Debris ☐ Deteriorated (concrete) ☐ Corroded (metal) ☐ Trash ☐ Yard Waste ☐ Other:
SUBMERGED IN WATER	☐ Yes ☐ No	☐ Partially ☐ Fully
SUBMERGED WITH SEDIMENT	☐ Yes ☐ No	☐ Partially ☐ Fully
FLOW	☐ Yes ☐ No	☐ Trickle ☐ Moderate ☐ Substantial
DEPOSITS/STAINS	☐ Yes ☐ No	☐ None ☐ Grease/Oil ☐ Paper/Trash ☐ Foam ☐ Heavy sedimentation deposits ☐ Other:
SURROUNDING VEGETATION	☐ Yes ☐ No	☐ Little to No Distress ☐ Moderate Distress ☐ High Distress
ABNORMAL VEGETATION IN OUTFALL	☐ Yes ☐ No	☐ Excessive ☐ Inhibited
ERODIBILITY	☐ Yes ☐ No	☐ Little or No Erosion ☐ Small Areas of Erosion ☐ Many Eroded Areas
POOR POOL QUALITY	☐ Yes ☐ No	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Algae ☐ Other:
PIPE BENTHIC GROWTH	☐ Yes ☐ No	☐ Brown ☐ Orange ☐ Green ☐ Other:

Section 3: Visual Inspection of Outfall Flow

VISUAL INSPECTION	PRESENT?	DESCRIPTIONS	RELATIVE SEVERITY INDEX
ODOR	☐ Yes ☐ No	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint ☐ 2 – Easily detected ☐ 3 – Noticeable from a distance
COLOR	☐ Yes ☐ No	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Red ☐ Orange ☐ Other:	☐ 1 – Faint colors in sample bottle ☐ 2 – Clearly visible in sample bottle ☐ 3 – Clearly visible in outfall flow
TURBIDITY	☐ Yes ☐ No	See severity	☐ 1 – Slight cloudiness ☐ 2 – Cloudy ☐ 3 – Opaque
FLOATABLES (DOES NOT INCLUDE TRASH)	☐ Yes ☐ No	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious ☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen) ☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, sanitary materials)

Section 4: Field Parameters

PARAMETER	BENCHMARK	EQUIPMENT TO USE	RESULT
TEMPERATURE	> 83°F [a]	Water Quality Meter or Thermometer	
CONDUCTIVITY	> 2,000 uS/cm [b]	Water Quality Meter	
SALINITY (PPT)	> 0.50 River [c]	Water Quality Meter	
SURFACTANTS (MG/L)	≥ 0.25 [d]	MBAS Test Kit (CHEMetrics K-9400)	
AMMONIA (NH_3) (MG/L)	≥ 0.50 [d]	Test Strips	
CHLORINE (MG/L)	≥ 0.02 [e]	Hach Pocket Colorimeter	

[a] 314 CMR 4.00, *Massachusetts Surface Water Quality Standards,* Class B Warm Water
[b] Center for Watershed Protection, *Illicit Discharge Detection and Elimination Manual*
[c] EPA, *Voluntary Estuary Monitoring Manual*
[d] EPA, *New England Bacterial Source Tracking Protocol*
[e] EPA NPDES, *General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts*

Section 5: Sample Collection for Laboratory Analysis

SAMPLE FOR LAB	RESPONSE
SAMPLE COLLECTED FOR LABORATORY ANALYSIS	☐ *Escherichia Coli* ☐ Fecal Coliform ☐ Total Nitrogen ☐ Turbidity ☐ Total Suspended Solids ☐ No Samples Collected for Lab
SAMPLE COLLECTION LOCATION	☐ Flow ☐ Pool
INTERMITTENT FLOW TRAP RECOMMENDED?	☐ Yes ☐ NO

Section 6: Notes

Town of Hampden Dry Weather Outfall Screening Memorandum

Town of Hampden Outfall Inventory and Dry Weather Screening Field Effort Summary

TO: Mark Langone, Highway Superintendent

FROM: Tracy Adamski, AICP; Emily Tully

COPY: Stormwater Committee

DATE: March 17, 2020

1 Background

The U.S. Environmental Protection Agency (EPA) nationally regulates the discharge of stormwater runoff that is transported into local water bodies through Municipal Separate Storm Sewer Systems (MS4) that are located in Urbanized Areas (also known as "regulated areas"). The Town of Hampden meets EPA's regulatory threshold, and therefore is required to be covered under a National Pollutant Discharge Elimination System (NPDES) permit for its stormwater discharges from the MS4 in its Urbanized Area. The portion of Hampden considered to be urbanized area regulated under the MS4 program is primarily in the area west of Wilbraham Road/Somers Road. The remaining area of Town east of Wilbraham Road/Somers Road is not considered to be part of the MS4 regulated area.

In Massachusetts, the EPA Region 1 and the Massachusetts Department of Environmental Protection (MassDEP) jointly administer the municipal stormwater program. EPA and MassDEP originally authorized Hampden to discharge stormwater in 2003 under a *NPDES General Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems*, known as the "2003 Small MS4 General Permit." The 2003 Small MS4 General Permit expired in May 2008, but remained in full force and effect until the 2016 replacement permit became effective on July 1, 2018. The Town of Hampden submitted a Notice of Intent (NOI) to EPA and MassDEP on September 28, 2018 for coverage under the reissued NPDES *General Permit for Stormwater Discharges from Small MS4 in Massachusetts* (known as the "2016 Small MS4 General Permit")[1] and the Town's Authorization to Discharge was issued by EPA and MassDEP on April 5, 2019.[2]

The Town of Hampden has developed a Stormwater Management Program (SWMP) to be consistent with the requirements of the 2016 Small MS4 General Permit.[3] The SWMP contains six elements called minimum control measures (MCMs) that, when implemented, should result in a significant reduction in pollutants discharged into receiving waters:

1. Public Education and Outreach
2. Public Involvement and Participation
3. Illicit Discharge Detection and Elimination (IDDE)
4. Construction Site Stormwater Runoff Control
5. Post-Construction Stormwater Management
6. Good Housekeeping and Pollution Prevention

[1] Town of Hampden, MA Notice of Intent for Coverage under Small MS4 General Permit (2018): https://www3.epa.gov/region1/npdes/stormwater/ma/tms4noi/hampden.pdf

[2] NPDES Permit ID # MAR041009, Town of Hampden, Authorization to Discharge Stormwater: https://www3.epa.gov/region1/npdes/stormwater/ma/tms4noi/hampden-auth.pdf

[3] Town of Hampden Stormwater Committee Webpage: https://www.hampdenma.gov/stormwater-committee

Under the MCM 3 Illicit Discharge Detection and Elimination (IDDE) Program, Section 2.3.4.7.b of the 2016 Small MS4 General Permit, Dry Weather Outfall and Interconnection Screening and Sampling, says that "**all outfalls/interconnections … shall be inspected for the presence of dry weather flow within three (3) years of the permit effective date**."

Dry Weather Flow: This term refers to when there is flow present at an outfall/ interconnection and there has been less than 0.10 inches of rainfall in the previous 24 hours and no significant snow melt is occurring.

As part of the IDDE Program required by Section 2.3.4.6 of the 2016 Small MS4 General Permit, Tighe & Bond developed a Hampden-specific *Dry Weather Sampling Procedure* for outfall investigations and sampling efforts. This sampling procedure describes the steps to follow to complete outfall investigations and dry weather flow sampling, including which constituents to sample for in each receiving waterbody's watershed. Hampden's *Dry Weather Sampling Procedure* is available in Appendix F of the IDDE Plan, which is located within Appendix H of the SWMP.

This memorandum presents a summary of Tighe & Bond's outfall inventory and dry weather screening investigations that were completed in the Fall of 2019 and findings for 100% of Hampden's MS4 regulated outfalls, and approximately 51% of Hampden's town-wide outfalls. During the Fall 2019 field effort, Tighe & Bond and Hampden staff completed 72 outfall investigations and sampled at 7 outfalls or upstream drainage structures with dry weather flow. Five additional outfalls were located and mapped. None of the outfalls investigated met EPA's criteria for a likely sewer input.

1.1 Preparation for Field Work

Prior to completing field work, Town staff provided Tighe & Bond with an initial outfall inventory list from the existing GIS mapping. The inventory was developed by categorizing "end of pipe" points from the GIS that met the definition of an outfall. Each outfall in the inventory was provided an initial priority ranking by Tighe & Bond prior to field work, as summarized in the Town of Hampden MS4 Outfall and Interconnection Inventory, Initial Ranking, and Initial Catchment Delineations Memorandum in Appendix D of the IDDE Plan.

1.2 Field Data Collection Tablet Application

Prior to the Fall 2019 outfall investigations, Tighe & Bond developed a digital field form in Survey123 for ArcGIS Online, which was used to record outfall attribute information (e.g., size, material, etc.) using a tablet during the field work. It was also used to note whether dry weather flow was present at each outfall and, if it was, the results of the sampling effort. An example of the Survey123 tablet form is shown in Figure 1.

Paper field sheets, which the tablet form is based on, were developed to be used in case of tablet error. An example of the paper field sheet is available in Appendix F of the IDDE Plan. Both the tablet form and paper sheet may be used for future outfall investigations and field efforts.



Figure 1: Screenshot of the Dry Weather Outfall Inspection Form

1.3 Surface Water Quality Standards

Per Section 2.3.4.7.b.iii.4.a) of the 2016 Small MS4 General, ammonia, chlorine, conductivity, salinity, *Escherichia coli* (*E. coli*), surfactants, and temperature must be measured at every outfall where dry weather flow is found.

The Town must also measure pollutants of concern for outfalls discharging directly to an impaired waterbody, including impaired waterbodies with and without approved Total Maximum Daily Loads (TMDLs). Table 1-1 lists impaired waterbodies in Hampden and the pollutants of concern associated with each, based on the *Massachusetts Year 2014 Integrated List of Waters*[4] and Appendix F of the 2016 Small MS4 Permit, *Requirements for Discharges to Impaired Waters with an Approved TMDL*.[5] Only those pollutants highlighted in blue have measurement requirements under the IDDE Plan.

Table 1
Impaired Waterbodies in Hampden, MA

Waterbody Name	Segment ID	Pollutants of Concern for Impairment
Long Island Sound	All	**Nitrogen (Total)**

Hampden's MS4 is located within the Connecticut River watershed, which is part of the drainage basin of the Long Island Sound. The Long Island Sound has an approved TMDL for nitrogen, which establishes both in-basin nitrogen reductions and out-of-basin (north of Connecticut) nitrogen reductions necessary to achieve water quality standards for Dissolved Oxygen in Long Island Sound. Per section 2.2.1(c)(i)(1) of the 2016 Small MS4 General Permit, the Town of Hampden must comply with the requirements of Appendix F part B.I with respect to nitrogen discharges.

Note that the *Massachusetts Year 2016 Integrated List of Waters* is available from MassDEP,[6] which lists the segment of the Scantic River in Hampden (MA34-30) as a Category 5 water requiring a TMDL for an *E. coli* impairment. As the sampling procedure included laboratory analysis for *E. coli* at locations where flow was present and samples were collected, the dry weather sampling addressed the *Massachusetts Year 2016 Integrated* List even though it was not finalized at the time of the development of the Dry Weather Sampling Procedure. .

Per Section 2.3.4.7.a.ii of the 2016 Small MS4 General Permit, likely sewer input indicators include 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.

No sewer exists in Hampden; however, sewer indicators can also identify connections from utility sinks, septic systems, and other potential illicit connections.

[4] Massachusetts Year 2014 Integrated List of Waters:

[5] Appendix F of the 2016 Small MS4 General Permit, Requirements for Discharges to Impaired Waters with an Approved TMDL: https://www3.epa.gov/region1/npdes/stormwater/ma/2016fpd/appendix-f-2016-ma-sms4-gp.pdf

[6] Massachusetts Year 2016 Integrated List of Waters: https://www.mass.gov/doc/final-massachusetts-year-2016-integrated-list-of-waters/download

1.4 Fall 2019 Field Work Background

Tighe & Bond along with Hampden Staff completed outfall investigations over four (4) days in November 2019, including gathering outfall inventory data and sampling at outfalls if dry weather flow was present. The *Dry Weather Sampling Procedure* was followed for each outfall investigation and may be used for future outfall investigations.

Inventory/Inventoried: This term refers to the General Permit requirement in *Section 2.3.4.7.a* to visually inspect each outfall during dry weather conditions and collect prescribed data such as location, size, and visual and olfactory evidence of an illicit discharge.

Tighe & Bond attempted to visit 72 outfalls, which is 100% of the Town's mapped MS4 outfalls, and 51% of the Town's total outfalls. Please see Section 2 of this memorandum for results from the field effort.

Tighe & Bond has delivered updated GIS to the Town with the results of the outfall investigation and dry weather sampling, including photographs of the outfalls investigated, additional outfall attributes, and water quality screening and laboratory results.

The map in Attachment 1 shows the locations of all mapped outfalls in Hampden. Each outfall is denoted as to whether the outfall was visited during this field effort and confirmed to be an accurately mapped outfall.

Attachment 2 provides a summary of the screening status of each of the outfalls visited during the Fall 2019 field effort, including an inventory and/or dry weather screening where appropriate.

A summary table in Attachment 3 includes the Town's outfall inventory developed under the IDDE Plan, with sampling requirements, investigation dates, and notes for each outfall investigated during the Fall 2019 field effort. All municipal outfalls within the urbanized area were visited as noted herein. Tighe & Bond or the Town will continuously update this table during subsequent outfall investigations or if other MS4 outfalls are identified.

2 Dry Weather Investigation Results

Section 2 of this memorandum presents the results of the outfall investigations and dry weather flow sampling. The following is a summary of the Fall 2019 field work results:

- 72 outfalls were visited during this field effort. Of the 72:
    - 70 were attempted to be investigated. These outfalls are denoted with purple triangles in Attachment 1.
    - 1 was visited and should be removed from the outfall list because it is another stormwater asset (outlet to a culvert). This outfall, 135_OF, is denoted as a blue triangle in Attachment 1.
    - 1 outfall should be removed from the outfall list because it is privately owned and operated. This outfall (30_OF) is denoted as a blue triangle in Attachment 1.
- Of the 70 outfalls that were attempted to be investigated:
    - 59 were successfully screened for dry weather flow. These outfalls are denoted with green triangles in Attachment 2.
        - 12 of these outfalls were partially or fully submerged and dry weather flow screening was conducted at the next upstream structure.

        - 7 of these outfalls had dry weather flow and were sampled. If the outfall was submerged in a water body, samples were taken from the upstream catch basin or drain manhole. These outfalls are denoted with purple circles in Attachment 2.
        - 5 of these outfalls were newly discovered, mapped in GIS, and investigated during this field effort.
    - 11 of the 70 outfalls were visited but not fully investigated.
        - 1 of these outfalls was located but could not be accessed. This outfall is denoted with a blue triangle in Attachment 2.
        - 10 of these outfalls could not be located. These outfalls are denoted with orange triangles in Attachment 2.

  Subtotal: 70 attempted outfall investigations; 1 outfall was visited and should be removed from the outfall list because it is another stormwater asset (i.e., culvert ends or BMP structures) and 1 outfall should be removed from the outfall list because it is privately owned and operated.

- 61 outfalls were not visited because they are outside of the MS4 Urbanized Area limits. These outfalls are denoted with gray triangles in Attachment 1.
- **Starting Outfall Inventory: 128 mapped outfalls Town-wide**
- **Updated Outfall Inventory: 131 mapped outfalls Town-wide**

2.1 Dry Weather Flow Sampling Results

Per Section 2.3.4.7.a of the 2016 Small MS4 General Permit, all outfalls within the MS4 must be priority ranked based on their illicit discharge potential. As described in Section 1.3 of this memorandum, outfalls should be considered high priority if there is dry weather flow with pollutant concentrations or visual observations that meet the criteria for a likely sewer input. The 2016 Small MS4 General Permit also requires that discharges that may cause or contribute to an in-stream exceedance of surface water quality standards should be considered a high priority for catchment investigations.

Tighe & Bond sampled at 7 outfalls or upstream drainage structures with dry weather flow during the Fall 2019 field effort; these outfalls are marked with a purple circle on Attachment 2. Sampling results are included in the Outfall Sampling Results Summary in Attachment 4. The Summary has a color-coded ranking system for the results of the outfall monitoring, which demonstrates the severity of the sampling results (i.e., a red result denotes a higher, potentially problematic concentration of a stormwater pollutant). The ranking system uses known EPA benchmarks for each pollutant analyzed. This system was used to clearly understand the water quality at each outfall and will be used to determine the follow-up outfall prioritization required by Section 2.3.4.7.c of the 2016 Small MS4 General Permit. At the conclusion of all of the outfall investigation field work, a priority ranking of "problem", "low", or "high" will be given to each outfall depending on sampling results and its potential for the presence of an illicit discharge.

Characteristics of Likely Sewer Input: No location met EPA's criteria for a likely sewer input.

- All outfalls sampled had elevated levels of total nitrogen; however, it is unlikely that there is a sewer input to these outfalls as the Town does not have a sewer system. Nitrogen alone is not an indicator of likely sewer input, and the indicative parameters surfactants, *E. coli*, and ammonia levels were at low levels. Sources of nitrogen can include decaying organic matter; animal and human excreta; agriculture and fertilizer; or chemical waste.

- While outfall 13_OF had elevated levels of *E. coli*, it is unlikely that there is a sewer input to this outfall, as ammonia, surfactants, and chlorine levels were below benchmark limits and there is no Town sewer. This outfall will be ranked as high priority in the Outfall/Interconnection Inventory and Priority Ranking, and observation of the surrounding land use may help determine the source of elevated *E. Coli*.
- Three of the sampled outfalls had chlorine levels greater than the EPA benchmark of 0.02 mg/L, which may indicate potable water source inputs. However, none of these outfalls met the criteria for likely sewer input as levels of ammonia, surfactants, and E. coli were non-detect or below the benchmark for each of these outfalls. Sources of the chlorine may include water main leaks or breaks, hydrant flushing (however, there are no Town hydrants), or chlorinated pool water discharges to the storm drain.

2.2 Outfalls That Could Not Be Located

Table 2 below summarizes the 10 outfalls that could not be located during this field effort after a significant attempt to do so. These outfalls are noted in Attachment 2 as "Investigation Attempted – Could Not Locate" and additional notes are provided in Attachment 3. It is recommended that the Town attempts to locate these outfalls again under a subsequent field effort. Locating the outfalls may also require further improvement of the Town's stormwater mapping to update connectivity and outfall location.

Table 2
Outfalls That Could Not Be Located (Fall 2019)

Outfall ID	Street	Notes
8_OF	Circle View Drive	Not located but line appears to go out toward wetland.
105_OF	Sessions Drive	Likely not existent. No catch basin in area.
120_OF	Raymond Drive	Submerged, cannot properly identify.
129_OF	Andrews Circle	Outfall not located. Does not seem to be accurate.
130_OF	Stony Hill Road	Outfall not located. Assumed to cross the road at catch basin and enter wetlands.
132_OF	Wilbraham Road	Cannot see pipe in catch basin due to standing water.
143_OF	Somers Road	Outfall not located
146_OF	Commercial Drive	Location appears to be accurate based on stagnant water and wetland vegetation. Could not find.
147_OF	Commercial Drive	Previous pics from unrelated drainage pipe
148_OF	Old Orchard Road	Appears to be correct. Couldn't locate.

2.3 Submerged Outfalls

The outfalls included in **Table 3** below were at least partially submerged due to high water levels downstream. Per Section 2.3.4.7.b.2.iii of the 2016 Small MS4 General Permit, if an outfall is inaccessible or submerged, the investigator shall proceed to the first accessible upstream drain manhole or catch basin for the observation and sampling effort and report the location with the screening results. Tighe & Bond attempted to complete dry weather monitoring in upstream structures for 12 submerged outfalls during this field effort. These outfalls are noted as "Attempted" in Attachment 1 and additional notes are provided in Attachment 3.

Table 3
Submerged Outfalls (Fall 2019)

Outfall ID	Street	Notes
2_OF	Allen Street	Partially submerged. Next to culvert, partially submerged. No flow in upstream catch basin.
3_OF	Allen Street	Partially submerged. No flow in upstream catch basin.
17_OF	Fernwood Drive	Partially submerged.
18_OF	Fernwood Drive	Fully submerged. Outfall underwater, no flow in upstream catch basin.
20_OF	Martin Farm Road	Partially submerged. Standing water in upstream catch basin, but no flow.
23_OF	Old Orchard Road	Partially submerged. No flow in upstream catch basin.
24_OF	Old Orchard Road	Partially submerged. No flow in upstream catch basin.
27_OF	Deerfield Circle	Partially submerged. No flow in upstream catch basin.
121_OF	Raymond Drive	Partially submerged, in standing water. No flow in catch basin, but standing water.
131_OF	Wilbraham Road	Partially submerged. Sample collected from upstream catch basin.
145_OF	Commercial Drive	Partially submerged. No flow in upstream catch basin.
149_OF	Carmody Road	Partially submerged. No flow in upstream catch basin.

The outfalls in **Table 3** should be revisited by Town staff to determine if drainage is functioning adequately.

2.4 Outfalls That Could Not Be Accessed

Table 4 below summarizes the one outfall that could not be accessed during this field effort after a significant attempt to do so. This outfall is noted in Attachment 2 as "Investigation Attempted – Could Not Access", and additional notes are provided in Attachment 3.

Table 4
Outfalls That Could Not Be Accessed (Fall 2019)

Outfall ID	Street	Notes
128_OF	Brian Court	Under dense vegetation in drainage area.

2.5 Outfalls to Reclassify

There was one (1) mapped outfall investigated in the Fall 2019 field work that was determined to be an outlet to a culvert. Note that while the 2016 Small MS4 General Permit does not require culverts to be investigated, **culverts "longer than a simple road crossing" must be included in the outfall inventory** unless it can be confirmed that the culvert is free of any connections. MS4 discharges to any culvert should be evaluated for illicit discharge potential.

Table 5 contains the outfall which Tighe & Bond recommends reclassifying and removing from the Town's outfall inventory. Structure 135_OF should be reviewed and confirmed by the Town before final removal from the outfall inventory. This "outfall" is noted as "Remove from Inventory" in Attachment 1 and additional notes are provided in Attachment 3.

Additionally, outfalls owned and operated by private or state entities should be removed from the Town's MS4 outfall inventory. Private outfalls and outfalls regulated under a separate NPDES permit are not regulated under the Town's MS4 permit and do not need to be included in the IDDE program. During the Fall 2019 field effort, one outfall was identified under this category.

Table 5
Outfalls to be Removed from the Outfall Inventory (Fall 2019)

Outfall ID	Street	Reason
135_OF	Wilbraham Road	South Branch Mille River crossing culvert out
30_OF	Wilbraham Road	Private outfall on Great Horse Golf Course Property

2.6 Outfalls Not Previously Mapped

Five (5) additional outfalls were mapped and inventoried while completing outfall investigations in Spring 2019. These outfalls are summarized in **Table 6**, marked with a green circle on Attachment 2, **Table** and additional notes are provided in Attachment 3.

Table 6
Outfalls to be Added to the Outfall Inventory (Fall 2019)

Outfall ID	Street	Reason
151_OF	Allen Crest Drive	Previously unmarked, off basins on Allen Crest Drive
152_OF	Stony Hill Road	New outfall connects to catch basin Stony 6 and catch basin Stony 5. Directly west of catch basin Stony 6.
153_OF	Carmody Road	Across street from 5 Carmody Road
154_OF	Grist Mill Lane	Drainage outfall ties into culvert that goes under road; no flow in culvert
155_OF	Mill Road	Adjacent to 8 Evergreen Terrace; outfall falls directly from road grate into culvert beneath road; pipes going perpendicular to culvert don't seem to connect to anything

2.7 Outfalls Requiring Maintenance

Some of the outfalls visited during Tighe & Bond's field efforts were partially or completely full of sediment, leaves, or debris. Tighe & Bond recommends that the outfall pipes and discharge areas of all outfalls are maintained on a regular basis for proper function of the drainage system. The outfalls included in **Table 7** below were noted to have maintenance issues during the Tighe & Bond field efforts and should be evaluated by Town staff as soon as possible and cleaned or repaired.

Table 7
Outfalls Requiring Maintenance (Spring 2019)

Outfall ID	Street	Reason
1_OF	Allen Street	Riprap mostly washed away, embankment on side of road with high potential to erode further; Pipe corroded, in bad shape
3_OF	Allen Street	Partially submerged in sediment
7_OF	Brookside Drive	Partially submerged in sediment
14_OF	Erica Circle	Partially clogged with debris
16_OF	Fernwood Drive	Pipe broken at end and deteriorated (concrete)

Table 7
Outfalls Requiring Maintenance (Spring 2019)

Outfall ID	Street	Reason
17_OF	Fernwood Drive	Pipe corroded (metal)
19_OF	Grist Mill Lane	Pipe deteriorated (concrete)
20_OF	Martin Farm Road	Partially submerged in sediment
22_OF	Oak Knoll Drive	Almost fully buried in sediment
25_OF	Potash Hill Lane	Pipe corroded (metal); Outfall bottom falling apart
26_OF	River Park Drive	Pipe deteriorated (concrete); Fully submerged in sediment
27_OF	Deerfield Circle	Pipe deteriorated (concrete); Partially submerged in sediment
28_OF	Sessions Drive	Pipe corroded (metal)
29_OF	Stony Hill Road	Partially submerged in sediment
107_OF	Ridgeway Road	Pipe corroded (metal); Partially submerged in sediment
110_OF	Mountainview Drive	Partially submerged in sediment
121_OF	Raymond Drive	Partially submerged in sediment
136_OF	Valley View Drive	Pipe corroded (metal)
138_OF	Maple Grove Road	Pipe corroded (metal)
140_OF	Wilbraham Road	Fully submerged in sediment
141_OF	Wilbraham Road	Partially submerged in sediment
145_OF	Commercial Drive	Partially submerged in sediment
149_OF	Carmody Road	Pipe corroded (metal)
152_OF	Stony Hill Road	Partially submerged in sediment

3 Data Issue Resolutions

As part of the field screening efforts, Tighe & Bond investigated previous Data Issues within the outfall map. **Table 8** summarizes the Data Issues investigated during field efforts that can be resolved. Tighe & Bond recommends that Town staff review these Data Issue resolutions and update the Town inventory.

Table 8
Data Issue Proposed Resolutions (Spring 2019)

Street	Issue Description	Issue Resolution
Brian Court	Leaching basins?	Eastern catch basins are leaching; western catch basins drain to outfall per Tighe & Bond visit on 11/7/19
Woodland Drive at Sessions Drive	Where does this [Catch Basin] go?	Confirmed to be a leaching basin – Tighe & Bond confirmed no outlet pipes on 11/7/19
Allen Street	Correct connectivity?	Drain lines as captured on GIS verified to be accurate in the field by Tighe & Bond on 11/7/2019

On Greenleaf Drive, further storm drain network investigations are required. Catch basins on the street appear to connect to a storm drain in the center of street. However, the storm drain main could not be traced to an outfall, or a connection to the drain main on Allen Street, per the Tighe & Bond and DPW inspection on 11/7/19. DPW staff mentioned anecdotally that residents on the street often complained about street flooding. Tighe & Bond recommends that Town staff investigate the drain line to confirm connectivity. Dye testing or video inspection of the main may be required to confirm the absence of a block in the main or dead-end pipe.



Figure 2: GIS Mapping of Greenleaf Drive

Conclusions & Recommendations

This outfall inventory and dry weather monitoring effort was completed as part of the Town's IDDE Program and begins to satisfy the requirements of Section 2.3.4.7 of the 2016 Small MS4 General Permit, *Outfall/Interconnection Inventory and Initial Ranking and Dry Weather Outfall and Interconnection Screening and Sampling*. This memorandum will be appended to the Town's written SWMP.

As of the date of this memorandum, Tighe & Bond has attempted to investigate all of the outfalls within Hampden's MS4 regulated area, with 10 outfalls that were unable to be located and 1 outfall that was unable to be accessed. Information gathered at the end of all outfall investigations and dry weather screening will help determine the follow-up outfall and interconnection prioritization.

The outfalls and upstream structures investigated during this field effort have no evidence of a direct or indirect sanitary wastewater connection.

The following are recommendations for the Town, which can be completed by the Town or a Contractor in subsequent Permit Years:

- **Follow-up investigations.** The Town should revisit outfalls listed in Sections 2.2-2.4 of this memorandum. Outfalls that could not be located during this or prior field efforts should be field located, inventoried, and screened for dry weather flow. Coordination with property owners should be completed to gain access to outfalls that were inaccessible during this field effort, and outfall investigations and dry weather screening completed.

  The Town should also revisit outfalls that were submerged once downstream water levels have receded to collect outfall inventory data. This work can be completed by the Town or a contractor under a subsequent contract.

- **Continue to improve drainage mapping.** Hampden should continue to improve drainage system mapping by digitizing record plans and/or GPS-locating structures, outfalls, and other drainage infrastructure. Connectivity between structures and outfalls must be investigated and confirmed, and the GIS mapping updated accordingly. Culvert outlets and BMP inlets that are currently marked as outfalls in GIS should be resolved and updated.

- **Develop and implement an outfall operation and maintenance (O&M) plan.** The Town should develop a plan and schedule to complete routine O&M at all municipally-owned outfalls within Town. This will be developed as part of the written Infrastructure Operation and Maintenance Program required under General Permit *Section 2.3.7.a.iii*, which is due within two (2) years of the effective date of the General Permit. In the short term, the Town should revisit locations listed in Section 2.7 of this memorandum, determine maintenance requirements, and record any action(s) taken.

- **Complete outfall/interconnection inventory and priority ranking.** Per Section 2.3.4.7 of the 2016 Small MS4 General Permit, the Town must locate, inventory, and prioritize all outfalls and interconnections and investigate them for dry weather flow by Permit Year 3. For the 70 outfalls screened during this effort, all will be categorized as low priority for catchment investigations except for 13_OF, which exceeded and the baseline bacteria benchmark, and will be categorized as high priority for catchment investigations.

Attachments

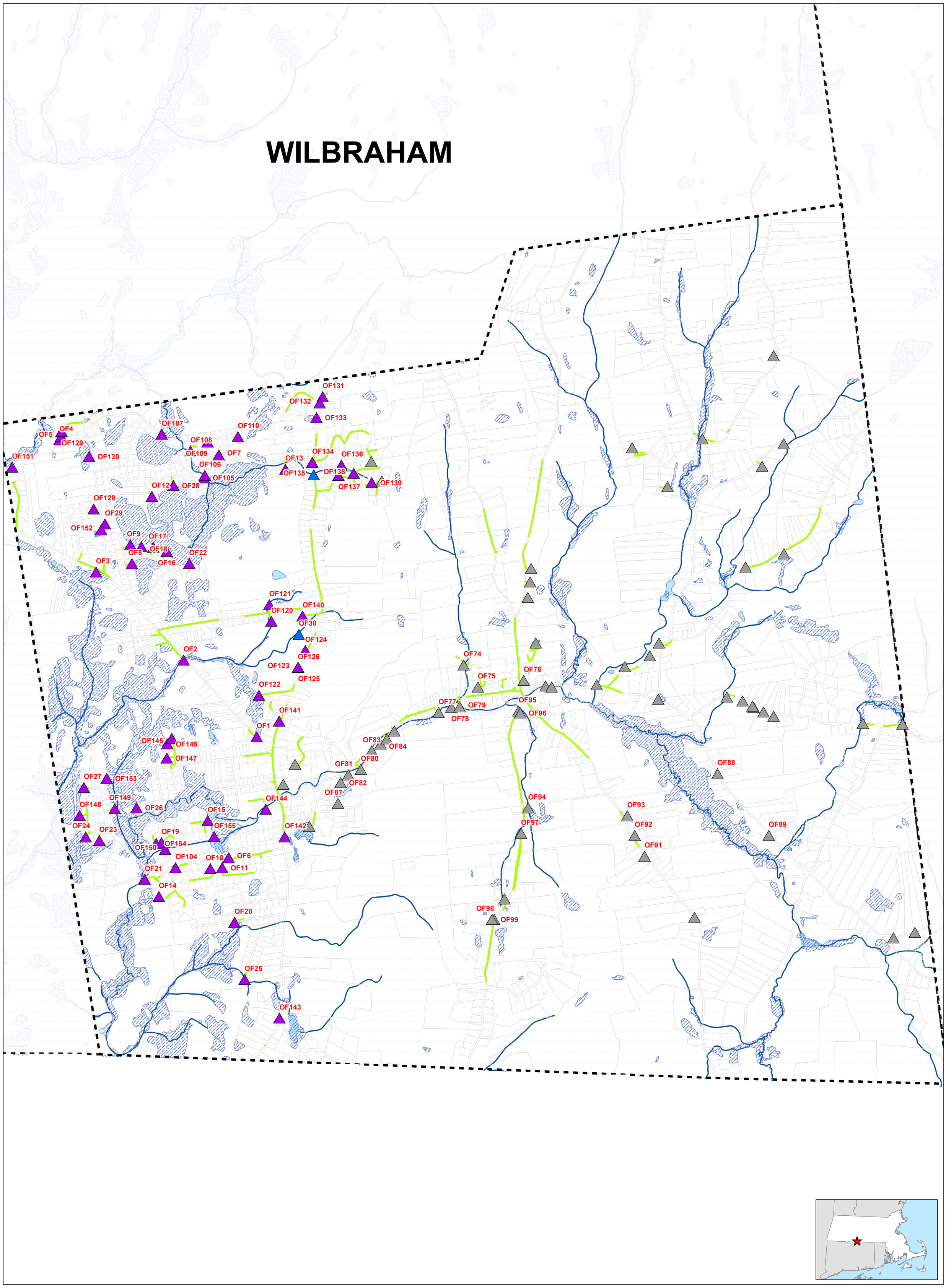
Attachment 1: Fall 2019 Outfall Inventory and Sampling Map – Investigation Status

Attachment 2: Fall 2019 Outfall Inventory and Sampling Map – Screening Status

Attachment 3: Outfall Inventory for Outfalls Investigated in Fall 2019

Attachment 4: Outfall Sampling Results Summary

WILBRAHAM



Legend

Investigation Status

- Investigation Attemped
- Remove from Inventory
- Did Not Visit

- Drain Line
- Town Boundary
- Parcel
- MassDEP Inland Wetlands
- MassDEP Coastal Wetlands

MassDEP Waterbodies

- Public Surface Water Supply (PSWS)
- Water Bodies
- Stream/Intermittent Stream

Tighe&Bond
Engineers | Environmental Specialists

Notes
1. MassGIS
2. Town of Dartmouth: Stormwater Infrastructure

1:14,400
0 1,200 2,400
Feet

N

ATTACHMENT 1
SPRING 2019 OUTFALL INVENTORY AND SAMPLING

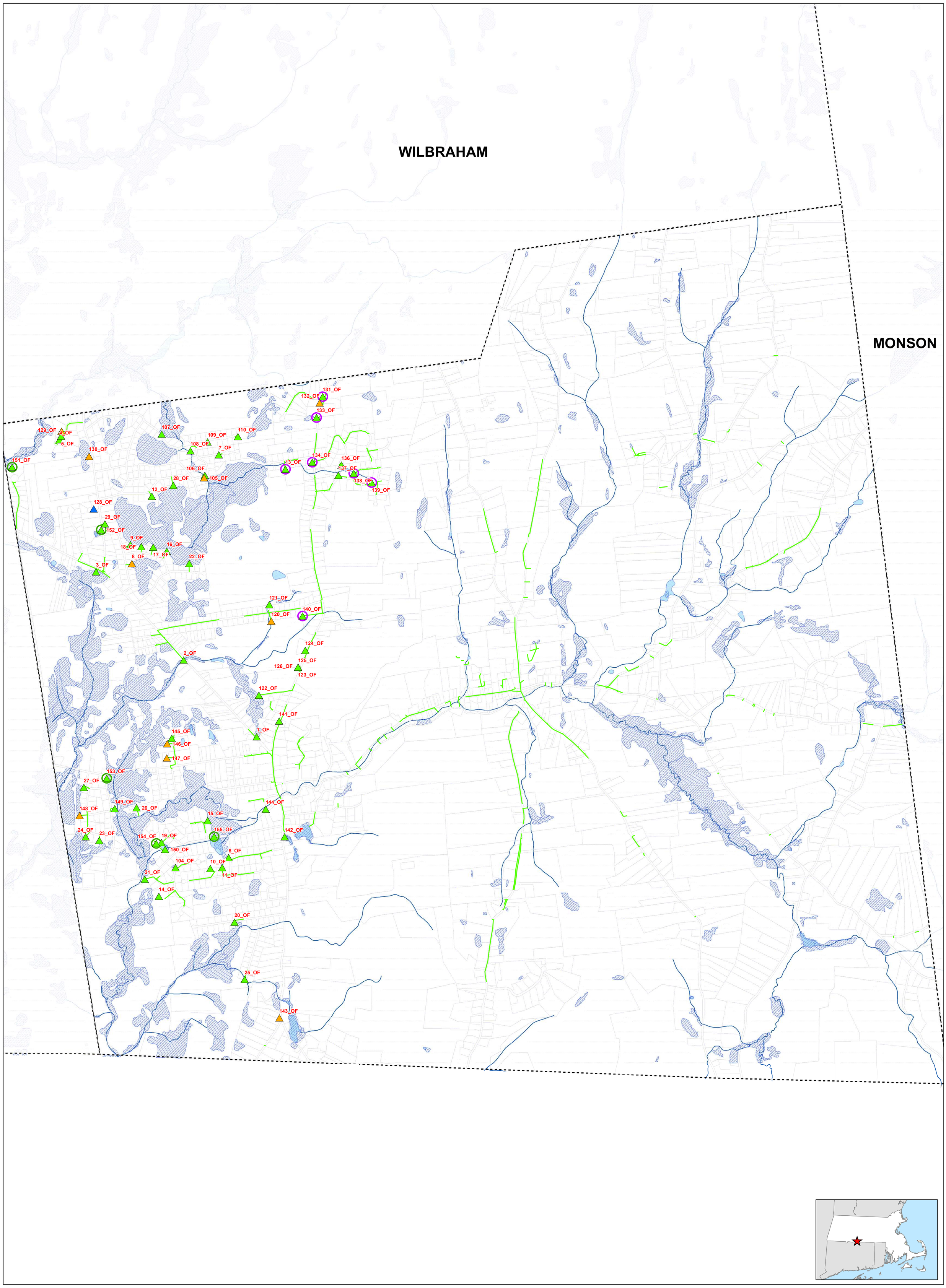
Hampden, Massachusetts

Jan 2020

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WILBRAHAM

MONSON



Legend

Outfall Screening Status:

- Investigation Attempted - Could Not Access
- Investigation Attempted - Could Not Locate
- Investigation Complete
- Newly Mapped
- Sampled

- Drain Line
- Town Boundary
- Parcel

MassDEP Waterbodies

- Public Surface Water Supply (PSWS)
- Water Bodies
- Stream/Intermittent Stream
- MassDEP Inland Wetlands
- MassDEP Coastal Wetlands

Tighe&Bond
Engineers | Environmental Specialists

Notes
1. MassGIS
2. Town of Dartmouth: Stormwater Infrastructure

1:14,400
0 1,200 2,400
Feet

N

ATTACHMENT 2
SPRING 2019 OUTFALL INVENTORY AND SAMPLING

Hampden, Massachusetts

Jan 2020

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Outfall ID	Location	ReceivingWater	Investigation Status	Screening Status	NewOutfall_ID	Investigators	Date	Time (24Hr)	Temperature (°F):	Rainfall Last 72 Hours (IN):	Rainfall Last 24 Hours (IN):	LocationDescription	OutfallDescription	Photo Description	Land Use in Drainage Area
1_OF	Allen Street	Wetland	Attempted	Completed	1_OF	MP	2019-11-05	13:23	54			Allen St.- Across from Mt. View	12” Metal. Broken at end	Riprap mostly washed away. Pipe in bad shape.	Commercial / Institutional
2_OF	Allen Street	Watchaug Brook	Attempted	Completed	2_OF	MP	2019-11-04	11:40	49			Allen St.- Opposite near Pinewood	20” concrete. Good condition	Next to culvert. Partially submerged. No flow in upstream cb	Residential
3_OF	Allen Street	Wetland	Attempted	Completed	3_OF	MP	2019-11-04	10:52	47			Allen St. Opposite Stony Hill	36” concrete. Good conditon	No upstream flow in cb	Residential
4_OF	Andrew Circle	Pond/Swamp	Attempted	Completed	4_OF	MP	2019-11-04	07:44	30			Andrew Circle - At End	Concrete 16”. Good condition		Residential
5_OF	Andrew Cricle	Pond/Swamp	Attempted	Completed	5_OF	MP	2019-11-04	07:52	30			Andrew Circle - Mid Way	30” concrete good condition.		Residential
6_OF	Bayberry Road	Mill Pond	Attempted	Completed	6_OF	MP	2019-11-05	14:32	53			Bayberry Road- Northwest bend	12” concrete good condition		Residential
7_OF	Brookside Drive	Brook	Attempted	Completed	7_OF	MP	2019-11-04	09:40	45			Brookside Drive- Mid way	15” ribbed Metal. Good condition		Residential
9_OF	Circle View Drive	Wetland	Attempted	Completed	9_OF	MP	2019-11-04	10:01	45			Circle View Drive - Northern end	Ribbed Metal. 12”. Good condition	Old replaced outfall sits next to new in use outfall	Residential
10_OF	Colony Drive	Mill Pond	Attempted	Completed	10_OF	MP	2019-11-04	15:06	55			Colony Drive - Mid	Not located property owner did not want us looking		Residential
11_OF	Colony Drive	Channel to mill pond	Attempted	Completed	11_OF	MP	2019-11-05	14:27	54			Colony Drive - North end	12” concrete good condition		Residential
12_OF	Crestwood Lane	Wetland	Attempted	Completed	12_OF	MP	2019-11-04	09:01	39			Crestwood Lane - Midway	12” ribbed Metal. Good condition		Residential
13_OF	Echo Valley Drive	Brook	Attempted	Completed	13_OF	MP	2019-11-05	07:35	41			Echo Valley Drive - 2/3 South side	Ribbed PLastic. 24”. Good condition	In stream, dry weather flow.	Residential
14_OF	Erica Circle	Channel (150’) to wetland	Attempted	Completed	14_OF	MP	2019-11-05	14:54	54			Erica Circle - First bend	12” concrete. Decent condition		Residential
15_OF	Evergreen Terrace	Small channel (30’) to scantic river	Attempted	Completed	15_OF	MP	2019-11-05	13:50	55			30’ off road	18” concrete. Good condition		Residential
16_OF	Fernwood Drive	Wetland	Attempted	Completed	16_OF	MP	2019-11-04	10:29	46			Fernwood Drive - Southern end	12” concrete. Slightly broken still functional	Pipe broken at end. Up stream basin has standing water.	Residential
17_OF	Fernwood Drive	Wetland	Attempted	Completed	17_OF	MP	2019-11-04	10:23	46			Fernwood Drive - Mid way	12” ribbed Metal. Bottom split but appears to be working		Residential
18_OF	Fernwood Drive	Wetland	Attempted	Completed	18_OF	MP	2019-11-04	10:18	46			Fernwood Drive - Northern end	Metal. Underwater difficult to assess	Outfall underwater. Photo of pipe in catch basin.	Residential
19_OF	Grist Mill Lane	Small drainage channel to dry stream bed. Stream bed appears to go to Scantic	Attempted	Completed	19_OF	MP	2019-11-05	14:11	54			Fox Run Lane - Mid way	Concrete. 12” good condition		Residential
20_OF	Martin Farm Road	Wetland	Attempted	Completed	20_OF	MP	2019-11-07	07:36	44			Martin Farm Road - Mid way		Standing water in upstream cb, but no flow.	Residential
21_OF	Mill Road	Small channel to Scantic River	Attempted	Completed	21_OF	MP	2019-11-04	14:48	55			Near bridge off road 10’	30” concrete. May be outfall for nearby “filled” outfall. Good condition	Right next to bridge over river	Residential
22_OF	Oak Knoll Drive	Wetland	Attempted	Completed	22_OF	No	2019-11-04	10:42	47			Oak Knoll Dr- North off End	Outfall not seen but line leads back toward wetland in back	Almost fully buried. Upstream cbn dry	Residential
23_OF	Old Orchard Road	Brook	Attempted	Completed	23_OF	No	2019-11-04	14:27	55			Old Orchard - South of beginning		No flow in upstream cb	Residential
24_OF	Old Orchard Road	Wetland	Attempted	Completed	24_OF	MP	2019-11-04	14:14	55			Old Orchard - South west bend		No flow in upstream cb	Residential
25_OF	Potash Hill Lane	Stream	Attempted	Completed	25_OF	MP	2019-11-07	07:29	43			Potash Hill Lane - At End		Outfall bottom falling apart	Residential
26_OF	River Park Drive	Scantic River	Attempted	Completed	26_OF	MP	2019-11-04	13:46	54			River Park Drive - South off end		Jus off of road. No flow in upstream cb	Residential
27_OF	Deerfield Circle	Dry Gully	Attempted	Completed	27_OF	MP	2019-11-04	13:55	55			Samble Lane - West off bend	10” concrete	Partially submerged in water. No flow upstream cb	Residential
28_OF	Sessions Drive	Small channel to wetland	Attempted	Completed	28_OF	MP	2019-11-04	09:09	39			Sessions Drive - South off	12” ribbed Metal. Damaged at end.		Residential
29_OF	Stony Hill Road	Channel to wetland	Attempted	Completed	29_OF	MP	2019-11-04	08:25	32			Stony Hill Road - East off Southern end	24” concrete. Good condition		Residential
104_OF	Genevieve Drive	Low land/ retention area	Attempted	Completed	104_OF	MP	2019-11-04	14:54	55			12’ off road	12” Concrete. Good condition		Residential

Outfall ID	Location	Section 2: Outfall Description	Other - Section 2: Outfall Description	Outfall Shape	Other - Outfall Shape	Outfall Material	Other - Outfall Material	Diameter / Dimensions	Slope	Submerged in Water?	Submerged in Sediment?	Pipe Condition	Other - Pipe Condition	Outlet Structure	Other - Outlet Structure	In-Stream?	Is Flow Present?	Flow Description	Section 3: Quantitative Characterization	Temperature (°C)	Conductivity (UScm)	Salinity (ppt)	Ammonia (mg/L)	Chlorine (> 0.02 mg/L)
1_OF	Allen Street	Single		Circular		CMP		12	Flat	No	No	Corroded_(metal)		Riprap		No	No		No					
2_OF	Allen Street	Single		Circular		RCP		24	Flat	Partially	No	Good		No Outfall Protection		Yes	No		No					
3_OF	Allen Street	Single		Circular		RCP		36	Flat	Partially	Partially	Good		No Outfall Protection		No	No		No					
4_OF	Andrew Circle	Single		Circular		RCP		16	Moderate	No	No	Good		Flared End		No	No		No					
5_OF	Andrew Cricle	Single		Circular		RCP		24	Moderate	No	No	Good		Flared End		No	No		No					
6_OF	Bayberry Road	Single		Circular		RCP		16	Moderate	No	No	Good		Riprap		No	No		No					
7_OF	Brookside Drive	Single		Circular		CMP		16	Flat	No	Partially	Good		Other	Stone blocks on road side	No	No		No					
9_OF	Circle View Drive	Single		Circular		CMP		12	Flat	No	No	Good		No Outfall Protection		No	No		No					
10_OF	Colony Drive	Single		Circular		HDPE		16	Flat	No	No	Good		Flared End		No	No		No					
11_OF	Colony Drive	Single		Circular		RCP		16	Flat	No	No	Good		Riprap		No	No		No					
12_OF	Crestwood Lane	Single		Circular		CMP		12	Moderate	No	No	Good		No Outfall Protection		No	No		No					
13_OF	Echo Valley Drive	Single		Circular		HDPE		24	Steep	No	No	Good		Riprap		Yes	Yes	Moderate	Yes	11.9 c			0	0
14_OF	Erica Circle	Single		Circular		RCP		16	Flat	No	Partially	Good,Clogged_with Debris		Other	Fe and rip rap	No	No		No					
15_OF	Evergreen Terrace	Single		Circular		RCP		18	Moderate	No	No	Good		Riprap		No	No		No					
16_OF	Fernwood Drive	Single		Circular		RCP		12	Flat	No	No	Deteriorated_(concrete)		No Outfall Protection		Yes	No		No					
17_OF	Fernwood Drive	Single		Circular		CMP		12	Flat	Partially	No	Corroded_(metal)		No Outfall Protection		Yes	No		No					
18_OF	Fernwood Drive	Single		Circular		CMP		12	Flat	Fully	No	Other	Unknown	No Outfall Protection		No	No		No					
19_OF	Grist Mill Lane	Single		Circular		RCP		16	Moderate	No	No	Deteriorated_(concrete)		Riprap		No	No		No					
20_OF	Martin Farm Road	Single		Circular		PVC		12	Flat	Partially	Partially	Good		Riprap		No	No		No					
21_OF	Mill Road	Single		Circular		RCP		30	Moderate	No	No	Good		Riprap		Yes	No		No					
22_OF	Oak Knoll Drive	Single		Circular		RCP		12	Flat	No	Fully	Other	Unknown due to burial	No Outfall Protection		No	No		No					
23_OF	Old Orchard Road	Single		Circular		RCP		12	Flat	Partially	No	Good		No Outfall Protection		No	No		No					
24_OF	Old Orchard Road	Single		Circular		RCP		16	Flat	Partially	No	Good		No Outfall Protection		No	No		No					
25_OF	Potash Hill Lane	Single		Circular		CMP		12	Steep	No	No	Corroded_(metal)		No Outfall Protection		Yes	No		No					
26_OF	River Park Drive	Single		Circular		CLAY		12	Flat	No	Fully	Deteriorated_(concrete)		No Outfall Protection		No	No		No					
27_OF	Deerfield Circle	Single		Circular		RCP		12	Flat	Partially	Partially	Deteriorated_(concrete)		Riprap		No	No		Yes					
28_OF	Sessions Drive	Single		Circular		CMP		12	Moderate	No	No	Corroded_(metal)		No Outfall Protection		No	No		No					
29_OF	Stony Hill Road	Single		Circular		RCP		20	Flat	No	Partially	Good		Headwall		No	No		No					
104_OF	Genevieve Drive	Single		Circular		RCP		24	Flat	No	No	Good		Headwall		No	No		No					

Outfall ID	Location	Section 4: Physical Indicators Present in the Flow?	Is there an odor present in the flow?	Relative Odor Severity Index (1-3)	Odor Description	Other - Odor Description	Is there any color present in the flow?	Relative Color Severity Index (1-3)	Color Description	Other - Color Description	Is there any turbidity present in the flow?	Relative Turbidity Severity Index (1-3)	Are any floatables present in the flow	Relative Floatables Severity Index (1-3)	Floatables Description	Other - Floatables Description	Section 5: Are physical indicators that are not related to flow present?
1_OF	Allen Street																
2_OF	Allen Street																
3_OF	Allen Street																
4_OF	Andrew Circle																
5_OF	Andrew Cricle																
6_OF	Bayberry Road																
7_OF	Brookside Drive																
9_OF	Circle View Drive																
10_OF	Colony Drive																
11_OF	Colony Drive																
12_OF	Crestwood Lane																
13_OF	Echo Valley Drive	No		None	No_Odor		No	None	No_Color		No	None	No	None	No_Floatables		No
14_OF	Erica Circle																
15_OF	Evergreen Terrace																
16_OF	Fernwood Drive																
17_OF	Fernwood Drive																
18_OF	Fernwood Drive																
19_OF	Grist Mill Lane																
20_OF	Martin Farm Road																
21_OF	Mill Road																
22_OF	Oak Knoll Drive																
23_OF	Old Orchard Road																
24_OF	Old Orchard Road																
25_OF	Potash Hill Lane																
26_OF	River Park Drive																
27_OF	Deerfield Circle																
28_OF	Sessions Drive																
29_OF	Stony Hill Road																
104_OF	Genevieve Drive																

Outfall ID	Location	Are Deposits or Stains Present?	Deposits / Stains Description	Other - Deposits / Stains Description	Deposits / Stains Comments	Is Surrounding Vegetation Present?	Vegetation Description	Surrounding Vegetation Comments	Is Abnormal Vegetation Present in Outfall?	Abnormal Vegetation Description	Abnormal Vegetation Comments	Is There Visible Erosion of Outfall?	Erodibility Description	Erodibility Comments	Is Pool Quality Poor?	Pool Quality Description	Other - Pool Quality Description	Pool Quality Description2	Is Pipe Benthic Growth Present?
1_OF	Allen Street				None			Healthy						High, embankment on side of road with high potential to erode further				None	
2_OF	Allen Street																		
3_OF	Allen Street																		
4_OF	Andrew Circle																		
5_OF	Andrew Cricle																		
6_OF	Bayberry Road				None			Healthy						Low, may need to add more rip rap				None	
7_OF	Brookside Drive																		
9_OF	Circle View Drive																		
10_OF	Colony Drive																		
11_OF	Colony Drive				None			Healthy						Low, riprap in good condition				None	
12_OF	Crestwood Lane																		
13_OF	Echo Valley Drive							Healthy						Rip rap looks good.				Part of stream, carried away quickly	
14_OF	Erica Circle				None			Healthy						Clean rip rap from outfall				None	
15_OF	Evergreen Terrace				None			Healthy						Low				None	
16_OF	Fernwood Drive																		
17_OF	Fernwood Drive																		
18_OF	Fernwood Drive																		
19_OF	Grist Mill Lane				None			Healthy						Riprap in good condition.				None	
20_OF	Martin Farm Road				None			Healthy						Could be eroded due to road runoff				Good	
21_OF	Mill Road																		
22_OF	Oak Knoll Drive																		
23_OF	Old Orchard Road																		
24_OF	Old Orchard Road																		
25_OF	Potash Hill Lane				None			Healthy						Falling apart, no outfall protection either				Good	
26_OF	River Park Drive																		
27_OF	Deerfield Circle																		
28_OF	Sessions Drive																		
29_OF	Stony Hill Road																		
104_OF	Genevieve Drive																		

Outfall ID	Location	Benthic Growth Description	Other - Benthic Growth Description	Benthic Growth Comments	Section 6: Overall Outfall Characterization as an Illicit Discharge	Section 7: Data Collection	Other - Section 7: Data Collection	Where were Samples Collected From?	Intermittent Flow Trap Recommended?	Section 8: Any Non-Illicit Discharge Concerns	OLD Outfall_ID	Note
1_OF	Allen Street			None		None					41	
2_OF	Allen Street					None					40	
3_OF	Allen Street					None					21	
4_OF	Andrew Circle					None					21	
5_OF	Andrew Cricle					None					22	
6_OF	Bayberry Road			None		None					100	
7_OF	Brookside Drive					None					30	
9_OF	Circle View Drive					None					17	
10_OF	Colony Drive					None						
11_OF	Colony Drive			None		None					101	
12_OF	Crestwood Lane					None					39	
13_OF	Echo Valley Drive			None	Unlikely	Surfactants_,Ammonia,E._Coli,Other	Nitrogen	Flow	No		5	
14_OF	Erica Circle			None		None					67	
15_OF	Evergreen Terrace			None		None					62	NewOutfall was Blank
16_OF	Fernwood Drive					None					14	
17_OF	Fernwood Drive					None					15	
18_OF	Fernwood Drive					None					16	
19_OF	Grist Mill Lane			None		None					70	
20_OF	Martin Farm Road			None		None						
21_OF	Mill Road										65	NewOutfall was Blank
22_OF	Oak Knoll Drive					None					Not observed	
23_OF	Old Orchard Road					None						
24_OF	Old Orchard Road					None						
25_OF	Potash Hill Lane			None		None						
26_OF	River Park Drive					None					Not found	
27_OF	Deerfield Circle					None					105	
28_OF	Sessions Drive					None					36	
29_OF	Stony Hill Road					None					20	
104_OF	Genevieve Drive					None					66	NewOutfall was Blank

Outfall ID	Location	ReceivingWater	Investigation Status	Screening Status	NewOutfall_ID	Investigators	Date	Time (24Hr)	Temperature (°F):	Rainfall Last 72 Hours (IN):	Rainfall Last 24 Hours (IN):	LocationDescription	OutfallDescription	Photo Description	Land Use in Drainage Area
106_OF	Sessions Drive	Brook	Attempted	Completed	106_OF	MP	2019-11-04	09:15	40			At catch basin	Direct drop. Drain into brook below road	Drops into culvert directly	Residential
107_OF	Ridgeway Road	Wetland	Attempted	Completed	107_OF	MP	2019-11-04	09:50	44			5’ off road	Mostly buried. Appears to be 12” metal		Residential
108_OF	Sessions Drive	Channel to wetland	Attempted	Completed	108_OF	MP	2019-11-04	09:26	42			100 feet off road between property lines	8 “ plastic. Good condition		Residential
109_OF	Mountainview Drive	Channel to wetland	Attempted	Completed	109_OF	MP	2019-11-04	09:30	42			15 feet off road	12” Metal corrugated. Good condition		Residential
110_OF	Mountainview Drive	Brook	Attempted	Completed	110_OF	MP	2019-11-04	09:35	43			25 feet off road	6” plastic. Good condition. Mostly buried line		Residential
121_OF	Raymond Drive		Attempted	Completed	121_OF	MP	2019-11-05	11:11	54				Inlet crosses road to outlet 12	In standing water. No flow in cb, but standing water	Residential
122_OF	Perennial Lane	Channel to wetland	Attempted	Completed	122_OF	MP	2019-11-05	12:54	54			Back of school in woods behind	24” concrete. Good condition		Commercial / Institutional
123_OF	Wilbraham Road	Channel to wetland	Attempted	Completed	123_OF	MP	2019-11-05	11:33	55				12” plastic. Good condition. Runs parallel to	Small pipe	Residential
124_OF	Wilbraham Road	Channel to wetland	Attempted	Completed	124_OF	MP	2019-11-05	11:27	55			15’ off road	24” plastic		Residential
125_OF	Wilbraham Road	Channel to wetland	Attempted	Completed	125_OF	MP	2019-11-05	11:31	55			25’ off road	Plastic 24”. Each runs from individual Catchbasin (not connected)		Residential
126_OF	Wilbraham Road	Channel to wetland	Attempted	Completed	126_OF	MP	2019-11-05	11:35	55			35’ off road	24” ribbed metal		Residential
131_OF	Wilbraham Road	Yes	Attempted	Completed	131_OF	MP	2019-11-05	08:13	42			Off road forming channel	Ribbed Metal. Approx 16”. Rocks on top. Good condition	In pool. Sample from upstream cb.	Residential
133_OF	Wilbraham Road	Yes	Attempted	Completed	133_OF	MP	2019-11-05	09:32	45			Off road forming channel	Concrete pipe. Rocks on top. Good condition. 24”		Residential
134_OF	Wilbraham Road	Yes	Attempted	Completed	134_OF	MP	2019-11-07	09:28	48			Off road creating stream channel. May be part of small intermittent stream	Concrete. 36”. Good condition		Residential
136_OF	Valley View Drive	Self formed channel minimal flow	Attempted	Completed	136_OF	MP	2019-11-07	10:20	49			Channel off road	Two pipes coming in with unknown origin. Two outfall pipes.	Two pipes, looks like either could be from basin. Basin has two pipes connected with unknown origin, not on map as drain lines.	Residential
137_OF	Pondview Drive	Small channel meets brook in approx 50’	Attempted	Completed	137_OF	MP	2019-11-05	09:58	50			Off road. Small channel	12” ribbed Metal. Decent condition. No water current.		Residential
138_OF	Maple Grove Road	Brook. Outfall is for brook. Catchbasin likely ties in underground	Attempted	Completed	138_OF	MP	2019-11-05	10:07	51			Off road used for brook channel	36” Plastic Ribbed. Good condition		Residential
139_OF	Pondview Drive	Brook	Attempted	Completed	139_OF	MP	2019-11-05	10:43	53			Off road carries to brook	Ribbed Metal pipe. 12”. Good condition		Residential
140_OF	Wilbraham Road		Attempted	Completed	140_OF	MP	2019-11-07	08:07	45					CNL outfall, but associated basin had flow, so sample collected. Dow worker indicated that pipe is still in use as well	Residential
141_OF	Wilbraham Road	Wetland	Attempted	Completed	141_OF	MP	2019-11-05	13:02	54			7 feet off road. Connects to WS-6	12” plastic. Good condition (new)	Checked upstream cb, standing water but no flow into pipe.	Residential
142_OF	Somers Road	Wetland/ small pond (1’ deep max)	Attempted	Completed	142_OF	MP	2019-11-07	07:46	44			25’ off road	Concrete 16” good condition		Residential
144_OF	Springmeadow Lane	Small channel (25’) to Scantic River	Attempted	Completed	144_OF	MP	2019-11-05	13:13	54			Far back property near river	12” concrete. Good condition	Goes to scantic river	Residential
145_OF	Commercial Drive		Attempted	Completed	145_OF	MP	2019-11-04	13:02	54					No flow in upstream cb	Industrial, Commercial / Institutional
149_OF	Carmody Road		Attempted	Completed	149_OF	MP	2019-11-04	14:35	55					No flow in upstream cb	Residential
150_OF	Grist Mill Lane	Channel to wetland	Attempted	Completed	150_OF	MP	2019-11-05	14:06	54			25’ off road	Concrete. 16” good condition		Residential
151_OF	Allen Crest Drive		Attempted	Completed	151_OF	MP	2019-11-07	13:00	45					Previously unmarked, off of basins on Allen crest	Residential
152_OF	Stony Hill Road		Attempted	Completed	152_OF	MP	2019-11-14	10:59	36	0.00	0.00			New outfall, connects to cb stony 6 and cb stony 5. Directly west of cb stony 6.	Residential
153_OF	Carmody Road		Attempted	Completed	153_OF	MP	2019-11-14	11:17	36					New outfall. Across street from 5 carmody rd.	Residential
154_OF	Grist Mill Lane		Attempted	Completed	154_OF	MP	2019-11-14	13:56	36	0.00	0.00			Outfall in culvert that goes under road. No flow in culvert.	Residential
155_OF	Mill Road		Attempted	Completed	155_OF	MP	2019-11-14	14:08	36	0.00	0.00			Outfall falls directly from grate into culvert beneath road. Pipes going perpendicular to culvert don’t seem to connect to anything.	Residential

Outfall ID	Location	Section 2: Outfall Description	Other - Section 2: Outfall Description	Outfall Shape	Other - Outfall Shape	Outfall Material	Other - Outfall Material	Diameter / Dimensions	Slope	Submerged in Water?	Submerged in Sediment?	Pipe Condition	Other - Pipe Condition	Outlet Structure	Other - Outlet Structure	In-Stream?	Is Flow Present?	Flow Description	Section 3: Quantitative Characterization	Temperature (°C)	Conductivity (UScm)	Salinity (ppt)	Ammonia (mg/L)	Chlorine (> 0.02 mg/L)
106_OF	Sessions Drive	Other	Direct drop	Other		Other			Flat	No	No	Other		Other		No	No		No					
107_OF	Ridgeway Road	Single		Circular		CMP		12	Flat	No	Partially	Corroded_(metal)		No Outfall Protection		No	No		No					
108_OF	Sessions Drive	Single		Circular		PVC		8	Moderate	No	No	Good		No Outfall Protection		No	No		No					
109_OF	Mountainview Drive	Single		Circular		CMP		12	Moderate	No	No	Good		No Outfall Protection		No	No		No					
110_OF	Mountainview Drive	Single		Circular		PVC		6	Steep	No	Partially	Good		No Outfall Protection		No	No		No					
121_OF	Raymond Drive	Single		Circular		RCP		12	Flat	Partially	Partially	Good		No Outfall Protection		Yes	No		No					
122_OF	Perennial Lane	Single		Circular		RCP		24	Flat	No	No	Good		Headwall		No	No		No					
123_OF	Wilbraham Road	Single		Circular		HDPE		12	Flat	No	No	Good		Headwall		No	No		No					
124_OF	Wilbraham Road	Single		Circular		HDPE		24	Steep	No	No	Good		Riprap		No	No		No					
125_OF	Wilbraham Road	Single		Circular		HDPE		24	Flat	No	No	Good		Other	Hw and riprap	No	No		No					
126_OF	Wilbraham Road	Single		Circular		CMP		24	Flat	No	No	Good		Riprap		No	No		No					
131_OF	Wilbraham Road	Other	Semicircle	Circular		RCP		16	Flat	Partially	No	Good		Headwall		Yes	Yes	Moderate	Yes	9.4	40.3	0.03	0.25	0.18
133_OF	Wilbraham Road	Single		Circular		RCP		30	Steep	No	No	Good		Headwall		Yes	Yes	Trickle	Yes	13.9	131.4	0.08	0	0.05
134_OF	Wilbraham Road	Single		Circular		RCP		36	Steep	No	No	Good		No Outfall Protection		Yes	Yes	Moderate	Yes	11.8	648.6	0.32	0.25	No reagent in kit
136_OF	Valley View Drive	Single		Circular		CMP		12	Moderate	No	No	Corroded_(metal)		No Outfall Protection		No	No		No					
137_OF	Pondview Drive	Single		Circular		CMP		12	Steep	No	No	Good		Riprap		No	No		No					
138_OF	Maple Grove Road	Single		Circular		CMP		36	Steep	No	No	Good,Corroded_ (metal)		Riprap		Yes	Yes	Trickle	Yes	13.1	770	0.5	0.25	0
139_OF	Pondview Drive	Single		Circular		CMP		12	Steep	No	No	Good		No Outfall Protection		No	Yes	Substatial	Yes	11.3	109.3	0.07	0.25	0.13
140_OF	Wilbraham Road	Single		Circular		Other, HDPE	Hdpe in basin	30	Flat	No	Fully	Other	Unknown	Other	Unknown	No	Yes	Trickle	Yes	7.7	155.5	0.07	0	Out of reagent
141_OF	Wilbraham Road	Single		Circular		HDPE		12	Flat	No	Partially	Good		No Outfall Protection		No	No		No					
142_OF	Somers Road	Single		Circular		RCP		16	Moderate	No	No	Good		Headwall		No	No		No					
144_OF	Springmeadow Lane	Single		Circular		RCP		12	Flat	No	No	Good		Other	Fe and riprap	Yes	No		No					
145_OF	Commercial Drive	Single		Circular		RCP		20	Flat	Partially	Partially	Other	Unknown	Flared End		No	No		No					
149_OF	Carmody Road	Single		Circular		CMP		30	Flat	Partially	No	Corroded_(metal)		No Outfall Protection		Yes	No		No					
150_OF	Grist Mill Lane	Single		Circular		RCP		16	Moderate	No	No	Good		Flared End		No	No		No					
151_OF	Allen Crest Drive	Single		Circular		RCP		16	Flat	No	No	Deteriorated_ (concrete)		No Outfall Protection		No	No		No					
152_OF	Stony Hill Road	Single		Circular		RCP		20	Flat	No	Partially	Good		Headwall		No	No		No					
153_OF	Carmody Road	Single		Circular		PVC		6	Flat	No	No	Good		No Outfall Protection		No	No		No					
154_OF	Grist Mill Lane	Single		Circular		RCP		16	Flat	No	No	Good		No Outfall Protection		No	No		No					
155_OF	Mill Road	Other	Direct drop	Other	Direct drop	Other	Direct drop		Flat	No	No	Good		No Outfall Protection		No	No		No					

Outfall ID	Location	Section 4: Physical Indicators Present in the Flow?	Is there an odor present in the flow?	Relative Odor Severity Index (1-3)	Odor Description	Other - Odor Description	Is there any color present in the flow?	Relative Color Severity Index (1-3)	Color Description	Other - Color Description	Is there any turbidity present in the flow?	Relative Turbidity Severity Index (1-3)	Are any floatables present in the flow	Relative Floatables Severity Index (1-3)	Floatables Description	Other - Floatables Description	Section 5: Are physical indicators that are not related to flow present?
106_OF	Sessions Drive																
107_OF	Ridgeway Road																
108_OF	Sessions Drive																
109_OF	Mountainview Drive																
110_OF	Mountainview Drive																
121_OF	Raymond Drive																
122_OF	Perennial Lane																
123_OF	Wilbraham Road																
124_OF	Wilbraham Road																
125_OF	Wilbraham Road																
126_OF	Wilbraham Road																
131_OF	Wilbraham Road	No		None	No_Odor		Yes	None	No_Color		Yes	1- Slight Cloudiness	No	None	No_Floatables		No
133_OF	Wilbraham Road	No		None	No_Odor		No	None	No_Color		No	None	No	None	No_Floatables		No
134_OF	Wilbraham Road	No		None	No_Odor		No	None	No_Color		No	None	No	None	No_Floatables		No
136_OF	Valley View Drive																
137_OF	Pondview Drive																
138_OF	Maple Grove Road	No		None	No_Odor		No						Yes	2- Some; Indications of origin (e.g. possible suds or oil sheen)	Suds		Yes
139_OF	Pondview Drive	No		None	No_Odor		No	None	Brown		Yes	2- Cloudy	Yes	1- Few/Slight; origin not obvious	Suds		No
140_OF	Wilbraham Road	No		None	No_Odor		No	None	No_Color		No	None	No	None	No_Floatables		No
141_OF	Wilbraham Road																
142_OF	Somers Road																
144_OF	Springmeadow Lane																
145_OF	Commercial Drive																
149_OF	Carmody Road																
150_OF	Grist Mill Lane																
151_OF	Allen Crest Drive																
152_OF	Stony Hill Road																
153_OF	Carmody Road																
154_OF	Grist Mill Lane																
155_OF	Mill Road																

Outfall ID	Location	Are Deposits or Stains Present?	Deposits / Stains Description	Other - Deposits / Stains Description	Deposits / Stains Comments	Is Surrounding Vegetation Present?	Vegetation Description	Surrounding Vegetation Comments	Is Abnormal Vegetation Present in Outfall?	Abnormal Vegetation Description	Abnormal Vegetation Comments	Is There Visible Erosion of Outfall?	Erodibility Description	Erodibility Comments	Is Pool Quality Poor?	Pool Quality Description	Other - Pool Quality Description	Pool Quality Description2	Is Pipe Benthic Growth Present?
106_OF	Sessions Drive																		
107_OF	Ridgeway Road																		
108_OF	Sessions Drive																		
109_OF	Mountainview Drive																		
110_OF	Mountainview Drive																		
121_OF	Raymond Drive				None			Healthy						Low erosion of surrounding area and outfall				Good	
122_OF	Perennial Lane				None			Healthy						Low				Good	
123_OF	Wilbraham Road				None			Healthy						Low				None	
124_OF	Wilbraham Road				None			Healthy						Low, may get some overflow from road				None	
125_OF	Wilbraham Road				None			Healthy						Low				None	
126_OF	Wilbraham Road				None			Healthy						Low				None	
131_OF	Wilbraham Road				None			Healthy						Could definitely be crushed by head wall if deterioration occurs.				Good	
133_OF	Wilbraham Road				None			Healthy						Could be crushed under rocks				No pool	
134_OF	Wilbraham Road				None			Healthy						Low, but no protection.				Good	
136_OF	Valley View Drive				None			Healthy						High, some corrosion, and no outfall protection.				None	
137_OF	Pondview Drive																		
138_OF	Maple Grove Road	Yes	Other	Orange staining on pipe	Orange staining	Yes	Little_or_No_Distress	Healthy	No			Yes	Many_Areas_of_Erosion	Some stones may give out in future	No			Mostly clear, some suds	No
139_OF	Pondview Drive				None			Healthy						High potential. In soil which is eroding				Suds	
140_OF	Wilbraham Road				Unknown			Unknown						Unknown				Unknown	
141_OF	Wilbraham Road																		
142_OF	Somers Road				None			Healthy, mostly leaf litter						Low, good condition with head wall.				None	
144_OF	Springmeadow Lane				None			Healthy						Low				None	
145_OF	Commercial Drive																		
149_OF	Carmody Road																		
150_OF	Grist Mill Lane				None			Healthy						Low, in good condition.				None	
151_OF	Allen Crest Drive				None			Healthy						High, no protection and some deterioration				None	
152_OF	Stony Hill Road																		
153_OF	Carmody Road																		
154_OF	Grist Mill Lane																		
155_OF	Mill Road																		

Outfall ID	Location	Benthic Growth Description	Other - Benthic Growth Description	Benthic Growth Comments	Section 6: Overall Outfall Characterization as an Illicit Discharge	Section 7: Data Collection	Other - Section 7: Data Collection	Where were Samples Collected From?	Intermittent Flow Trap Recommended?	Section 8: Any Non-Illicit Discharge Concerns	OLD Outfall_ID	Note
106_OF	Sessions Drive					None					35	
107_OF	Ridgeway Road					None					25	
108_OF	Sessions Drive					None					31	
109_OF	Mountainview Drive					None					32	
110_OF	Mountainview Drive					None					34	
121_OF	Raymond Drive			None		None					Not outfall	
122_OF	Perennial Lane			None		None					53	
123_OF	Wilbraham Road			None		None					45	NewOutfall was Blank
124_OF	Wilbraham Road			None		None					50	NewOutfall was Blank
125_OF	Wilbraham Road			None		None					43	
126_OF	Wilbraham Road			None		None					44	
131_OF	Wilbraham Road			None	Unlikely	Surfactants_,Ammonia,E._Coli,Other Nitrogen		Flow	No		1	
133_OF	Wilbraham Road			None	Unlikely	Surfactants_,Ammonia,E._Coli,Other Nitrogen		Flow	No		2	
134_OF	Wilbraham Road			None		Surfactants_,Ammonia,E._Coli,Other Nitrogen		Flow	No		3	
136_OF	Valley View Drive			None		None			No		6	
137_OF	Pondview Drive					None					9	
138_OF	Maple Grove Road				Unlikely	Surfactants_,Ammonia,E._Coli,Other Nitrogen		Flow			8	
139_OF	Pondview Drive			None	Unlikely	Surfactants_,Ammonia,E._Coli,Other Nitrogen		Flow	No		7	
140_OF	Wilbraham Road			Unknown	Unlikely	Surfactants_,Ammonia,E._Coli,Other Nitrogen		Flow	No			
141_OF	Wilbraham Road										42	
142_OF	Somers Road			None		None					61	
144_OF	Springmeadow Lane			None		None					60	
145_OF	Commercial Drive					None					New outfall 1	
149_OF	Carmody Road					None						
150_OF	Grist Mill Lane			None		None					63	
151_OF	Allen Crest Drive			None		None						
152_OF	Stony Hill Road					None						
153_OF	Carmody Road					None						
154_OF	Grist Mill Lane					None						
155_OF	Mill Road											

Outfall Sampling Results Summary - Hampden, MA

Location						Laboratory Analysis (1)				Water Quality Meter/Test Kit (1)				
Date	OLD Outfall ID	Outfall ID	NOI Receiving Water	Street	Sample Location	E. coli	Ammonia	Total Nitrogen	Surfactants	Temperature	Salinity	Conductivity	Chlorine	Ammonia
						CFU/100mL	mg/L	mg/L	mg/L	°F	ppt	µS/cm (2)	mg/L	mg/L
11/5/2019	OF-5	13_OF	Tributary to South Branch Mill River	Echo Valley Drive	Outfall	330	0.139	5.3	ND	53.4	-	-	0.00	0.00
11/5/2019	OF-1	131_OF	Tributary to South Branch Mill River?	Wilbraham Road	Upstream Catch Basin	2	ND	0.80	ND	48.9	0.03	40.3	0.18	0.25
11/5/2019	OF-2	133_OF	Tributary to South Branch Mill River?	Wilbraham Road	Outfall	10	ND	7.9	ND	57.0	0.08	131.4	0.05	0.00
11/5/2019	OF-8	138_OF	Tributary to South Branch Mill River?	Maplegrove Road	Outfall	8.0	0.391	5.1	ND	55.6	0.50	770.0	0.00	0.25
11/5/2019	OF-7	139_OF	Tributary to South Branch Mill River?	Pondview Drive	Outfall	8.0	ND	2.2	0.050	52.3	0.07	109.3	0.13	0.25
11/7/2019		140_OF	Watchaug Brook?	Wilbraham Road	Upstream Catch Basin	110.0	ND	0.77	0.050	45.9	0.07	155.5	-	0.00
11/7/2019	OF-3	134_OF	Tributary to South Branch Mill River	Wilbraham Road	Outfall	3.0	0.161	4.8	ND	53.2	0.32	648.6	-	0.25

REPORTING LIMITS
Ammonia = 0.075 mg/L
Surfactants = 0.050 mg/L
E. coli = 2 CFU/100mL
Fecal Coliform = 2 CFU/100mL
Total Phosphorus = 0.01 mg/L
"ND" = none detected

COLOR KEY (benchmarks are bold)									
	E. coli	Ammonia	Total Nitrogen	Surfactants	Temperature	Salinity	Conductivity	Chlorine	Ammonia
	CFU/100 mL	mg/L	mg/L	mg/L	°F	ppt	µS/cm	mg/L	mg/L
	≥ 10,000	≥ 6.000	≥ 2.13	≥ 1.000		≥ 1.00	**≥ 2,000**	≥ 1.00	≥ 6.0
	≥ 1,260	≥ 1.000	≥ 1.35	≥ 0.500		≥ 0.75	≥ 1,500	≥ 0.30	≥ 1.0
	≥ 235	**≥ 0.500**	**≥ 0.57**	**≥ 0.250**	**≥ 83.0**	**≥ 0.50**	≥ 1,000	**≥ 0.02**	**≥ 0.5**
	< 235	< 0.5	< 0.57	< 0.25	< 83	< 0.5	< 1,000	< 0.02	< 0.5

Notes for Results Summary:

(1) "-" means no analysis was completed

(2) µS/cm is equivalent to µmhos/cm

Benchmark Sources:

Ammonia, Surfactants, and Chlorine - *EPA General Permit for Stormwater Discharges from Small MS4 in Massachusetts*

E. coli, Temperature, and Dissolved Oxygen - *314 CMR 4.00: Massachusetts Surface Water Quality Standards*

Total Nitrogen - *EPA Ambient Water Quality Criteria Recommendations for Rivers and Streams in Nutrient Ecoregion XIV*

Salinity - *EPA Volunteer Estuary Monitoring: A Methods Manual*

Conductivity - *Center for Watershed Protection Illicit discharge Detection and Elimination Guidance Manual*






Town of Hampden, Massachusetts

Municipal Facilities and Activities Inventory and Operations & Maintenance Plan

NPDES Permit # MAR041009

February 2020

Provided under separate cover






Town of Hampden, Massachusetts

Hampden Highway Department Garage Stormwater Pollution Prevention Plan (SWPPP)

589 Main Street, Hampden, MA

NPDES Permit # MAR041009

February 2020

Provided under separate cover



Town of Hampden, Massachusetts

Hampden Transfer Station Stormwater Pollution Prevention Plan (SWPPP)

Cross Road, Hampden, MA

NPDES Permit # MAR041009

February 2020

Provided under separate cover

Revised Town of Hampden's General Bylaws Ch XIV-A Erosion and Sediment Control for Stormwater Management as adopted at Town Meeting on May 10, 2021

CHAPTER XIV (A) Erosion and Sediment Control for Stormwater Management
(Adopted April 28, 2008)

SECTION 1. PURPOSE AND AUTHORITY

1. Purpose

A. The purpose of this bylaw is to better manage land development in order to protect, maintain, and enhance the public health, safety, and general welfare of the citizens of Hampden by establishing minimum requirements and procedures to control the adverse impacts associated with stormwater runoff.

B. The proper management of stormwater runoff will meet the following objectives:

1. Reduce the adverse water quality impacts of stormwater discharges to rivers, lakes, reservoirs and streams in order to attain federal water quality standards;
2. Prevent the discharge of pollutants, including hazardous chemicals, into stormwater runoff;
3. Minimize the volume and rate of stormwater which is discharged to rivers, streams, reservoirs, and lakes that flows from any site during and following development;
4. Prevent erosion and sedimentation from land development, and reduce stream channel erosion caused by increased runoff;
5. Provide for the recharge of groundwater aquifers and maintain the base flow of streams;
6. Provide stormwater facilities that are attractive, maintain the natural integrity of the environment, and are designed to protect public safety;
7. Maintain or reduce pre-development runoff characteristics after development to the extent feasible;
8. Minimize damage to public and private property from flooding;
9. Encourage the use of Low Impact Development (LID) practices such as reducing impervious cover, treating and infiltrating stormwater at the source, utilizing environmentally sensitive site design, and, the preservation of open space and natural areas, to the maximum extent practicable;
10. Ensure that these management controls are properly maintained.

2. Authority

The Board of Selectman, its employees or agents are designated to enforce this bylaw. The Board of Selectman shall delegate Town agencies to administer, implement and enforce this bylaw. These agencies shall be herein referred to as "Designated Agent" by powers delegated in writing by the Board of Selectmen.

SECTION 2. DEFINITIONS

The following definitions describe the meaning of the terms used in this Bylaw:

AUTHORIZED ENFORCEMENT AGENCY: The Board of Selectmen, its employees or Designated Agent to enforce this bylaw.

ADVERSE IMPACT means any deleterious effect on waters or wetlands, including their quality, quantity, surface area, species composition, aesthetics or usefulness for human or natural uses which are or may potentially be harmful or injurious to human health, welfare, safety or property, to biological productivity, diversity, or stability or which unreasonably interfere with the enjoyment of life or property, including outdoor recreation.

BEST MANAGEMENT PRACTICES (BMP) are structural or biological devices that temporarily store or treat urban stormwater runoff to reduce flooding, remove pollutants, and provide other amenities. They can also be non- structural practices that reduce pollutants at their source. BMPs are described in a stormwater design manual, Stormwater Handbook, Volume 2: Technical Guide for Compliance with Massachusetts Stormwater Management Standard (February, 2008, Massachusetts Department of Environmental Protection, as updated or amended. An unofficial copy can be obtained at https://www.mass.gov/guides/massachusetts-stormwater-handbook-and-stormwater-standards).

CONSTRUCTION ACTIVITY is disturbance of the ground by removal of vegetative surface cover or topsoil, grading, excavation, clearing or filling.

DESIGN STORM is a rainfall event of specified size and return frequency that is used to calculate the runoff

volume and peak discharge rate to a BMP.

DESIGNATED AGENT: The Building Inspector or assigned replacement in cooperation with the Board of Selectmen, Planning Board, Conservation Commission and Highway Department shall be the enforcing agent for this bylaw.

DETENTION is the temporary storage of storm runoff in a BMP, which is used to control the" peak discharge rates, and which provides gravity settling of pollutants.

DISTURBANCE is any land clearing, grading, bulldozing, digging or similar activities.

DRAINAGE AREA means that area contributing runoff to a single point measured in a horizontal plane, which is enclosed by a ridgeline.

DRYWELL is similar to an infiltration trench but smaller with inflow from a pipe; commonly covered with soil and used for drainage areas of less than 1 acre such as roadside inlets and rooftops runoff.

EASEMENT means a grant or reservation by the owner of land for the use of such land by others for a specific purpose or purposes, and which must be included in the conveyance of land affected by such easement.

FLOW ATTENUATION means prolonging the flow time of runoff to reduce the peak discharge.

HYDROLOGY MODEL may include one of the following:

- TR-20, a watershed hydrology model developed by the Natural Resources Conservation Service act that is used to route a design storm hydrograph through a pond;
- TR 55, or Technical Release 55, "Urban Hydrology for Small Watersheds" is a publication developed by the Natural Resources Conservation Service to calculate stormwater runoff and an aid in designing detention basins;
- HydroCAD.

IMPERVIOUS SURFACES are areas, such as pavement or rooftops, which prevent the infiltration of water into the soil.

INFILTRATION is the downward movement of water from the surface to the subsoil.

INFILTRATION TRENCH is a stormwater management excavation filled with aggregate which removes both soluble and particulate pollutants. Trenches are not intended to trap coarse sediments.

LOW IMPACT DEVELOPMENT (LID) is a set of approaches that seeks to mimic a site’s predevelopment hydrology using design techniques that infiltrate, filter, store, evaporate and detain runoff close to its source. Instead of conveying, managing and/or treating stormwater in large, end-of-pipe facilities, LID utilizes small-scale, decentralized practices that infiltrate, treat, evaporate, and transpire rain water and snow melt including bioretention areas, grassed swales, reducing impervious areas, preservation of open space, development density, lot size and configuration, street design, parking design, and other structural stormwater treatment methods.

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) is the system of conveyances designed or used for collecting or conveying stormwater, including any road with a drainage system, street, gutter, curb, inlet, piped storm drain, pumping facility, retention or detention basin, natural or manmade or altered drain channel, reservoir, and other drainage structure that together comprise the storm drainage system owned, operated and maintained by the Town of Hampden.

NEW DEVELOPMENT any construction activities or land alteration on an area that has not previously been developed to include impervious cover.

OUTFALL is the terminus of a storm drain or other stormwater structure where the contents are released.

PEAK DISCHARGE is the maximum instantaneous rate of flow during a storm, usually in reference to a specific design storm event

PERMEABLE SOILS are soil materials with a sufficiently rapid infiltration rate so as to greatly reduce or

eliminate surface and stormwater runoff. These soils are generally classified as U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) hydrologic soil types A and B.

PERSON is any individual, group of individuals, association, partnership, corporation, company, business, organization, trust, estate, administrative agency, public or quasi-public corporation or body, the Commonwealth or political subdivision to the extent permitted by law thereof.

POLLUTANT is any element or property of sewage, residential, agricultural, industrial, or commercial waste, runoff, leachate, heated effluent, or other matter whether originating at a point or non-point source, that is or may be introduced into any storm drain system, waters of the United States, and/or Commonwealth. Pollutants shall include without limitation:

1. paints, varnishes, solvents;
2. oil, grease, antifreeze, other automotive fluids and/or products;
3. non-hazardous liquid and solid wastes;
4. refuse, garbage, litter, rubbish, yard wastes, or other discarded or abandoned objects, ordnances, accumulations and floatables;
5. chemicals, including but not limited to pesticides, herbicides, and fertilizers;
6. hazardous materials and wastes as defined by MGL 310 CMR 40 and 310 CMR 30;
7. sanitary waste;
8. dissolved and particulate metals;
9. metal objects or materials;
10. animal wastes;
11. rock, sand, salt, soils, or other products/materials that mobilize in surface water runoff;
12. and construction wastes and/or residues, including but not limited to, discarded building materials and concrete washout.

REDEVELOPMENT is any construction, land alteration, or improvement of impervious surfaces that does not meet the definition of new development

RETENTION is the holding of runoff in a basin without release except by means of evaporation, infiltration, or emergency bypass.

SMALL MS4 GENERAL PERMIT: EPA General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts, dated April 2016, as amended.

START OF CONSTRUCTION is the first land-disturbing activity associated with a development, including land preparation such as: clearing, grading and filling; installation of streets and walkways; excavation for basements; footings, piers or foundations; erection of temporary forms; and installation of accessory buildings such as garages.

SWALE is a natural depression or wide shallow ditch used to temporarily store, route, or filter runoff.

USGS HUC 12: United States Geological Survey 12-digit Hydrologic Unit Code, a geographic area representing part of all of a surface drainage basin, a combination of drainage basins, or a distinct hydrologic feature as delineated by the USGS. HUC 12 are identified and boundaries are viewable on MassGIS.

SECTION 3. APPLICABILITY

1. Applicability

Prior to the issuance of any site plan approval or development permit for any proposed development listed below, a stormwater management permit, or a waiver of the requirement for a stormwater management permit, must be approved by the Designated Agent. The Designated Agent shall coordinate with other appropriate Boards or Commission having other permit authority and review procedures for land use. The stormwater management permit waiver shall only be granted for residential projects.

No person shall, on or after the effective date of the bylaw, initiate any land clearing, land grading, earth moving or development activities without first complying with this bylaw. The following uses and activities shall be

required to submit drainage reports, plans, construction drawings, specifications and as-constructed information in conformance with the requirements of this bylaw:

A. Multi-family residential developments involving four or more units;
B. Any new commercial, industrial, and institutional structures under the same ownership, with at least 5,000 square feet of gross floor area, 10,000 square feet of impervious surface, or that require 10 or more parking spaces.
C. Redevelopment or additions to existing commercial, industrial, and institutional uses which result in an additional impervious surface area or gross floor area of greater than 5,000 square feet, or which results in an increase of 10 or more parking spaces.
D. Subdivisions and construction activities of any kind disturbing greater than 40,000 square feet.
E. Development or redevelopment involving multiple separate activities in discontinuous locations or on different schedules if the activities are part of a larger common plan of development that all together disturbs one or more acres.

2. Exemptions

To prevent the adverse impacts of stormwater runoff, the stormwater performance standards in Section 6 must be met at all construction activity or land disturbance that individually or as part of a Common Plan of Development resulting in disturbance of land in excess of the thresholds defined in Section 3.1.
The following activities are exempt from the requirements for submittal and approval of a stormwater management plan under Section 4.

A. Additions or modifications to existing single family structures as approved by the Designated Agent;
B. Residential developments that do not disturb more than 40,000 square feet of land, provided that they are not part of a larger common development plan;
C. Repairs to any stormwater treatment system deemed necessary by the Designated Agent;
D. Any emergency activity that is immediately necessary for the protection of life, property or the environment, as determined by the Designated Agent;
E. Any agricultural activity which is consistent with an approved soil conservation plan prepared or approved by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS);
F. Any logging which is consistent with a timber management plan approved under the Forest Cutting Practices Act by the Massachusetts Department of Conservation and Recreation;
G. Work undertaken by the Hampden Highway Department; and
H. Repairs or replacement of an existing sewage disposal system deemed necessary by the Board of Health.

3. Stormwater Design Manual

A stormwater design manual, Stormwater Handbook, Volume 2: Technical Guide for Compliance with Massachusetts Stormwater Management Standard (February, 2008, Massachusetts Department of Environmental Protection, as updated or amended) is hereby incorporated by reference as part of this bylaw, and shall furnish additional policy, criteria and information including specifications and standards, for the proper implementation of the requirements of this bylaw.

This manual includes a list of acceptable stormwater treatment practices, including the specific design criteria for each stormwater practice. The manual may be updated and expanded from time to time, based on improvements in engineering, science, monitoring and local maintenance experience, at the discretion of the Hampden Designated Agent or Massachusetts Department of Environmental Protection. Stormwater treatment practices that are designed and constructed in accordance with these design and sizing criteria will be presumed to meet the minimum water quality performance standards.

SECTION 4. PERMIT PROCEDURES AND REQUIREMENTS

1. Permit Required

No land owner shall commence land disturbance activities, without approval of a Stormwater Management Permit from the Designated Authority and meeting the requirements of this bylaw.

2. Application Requirements

Application for approval of a Stormwater Management Permit shall include the following:

A. A stormwater management plan or an application for waiver shall be submitted to the Designated Agent for review and approval for any proposed development specified in Section 3.1. Three copies of the stormwater management plan shall be submitted, and clearly labeled, along with other documents required in this bylaw for site plan review. The plan shall contain supporting computations, drawings, and sufficient information describing the manner, location, and type of measures in which stormwater runoff will be managed from the entire development. The plan shall serve as the basis for all subsequent construction.
B. An erosion and sediment control plan, which shall contain sufficient information to describe the nature and purpose of the proposed development.
C. A maintenance agreement
D. A non-refundable permit review fee

The applicant may request, and the Designated Agent may grant, a waiver from any information requirements it judges to be unnecessary to the review of a particular plan

3. Procedures for Review and Approval of Stormwater Permits

A. The procedures for review and approval of stormwater management permits shall be consistent with review procedures of Town Boards, as appropriate for the use.
B. The Designated Agent shall refer all major stormwater management permit applications to the appropriate Board, Commission and/or Department for review and shall consider any comments submitted by Board, Commission and/or Department during the review period. Within 21 days of receipt of a complete application the Designated Agent will distribute and notify the appropriate agencies.

4. Criteria for Review of Stormwater Permits

In addition to other criteria used by the Designated Agent in making permit decisions, for the uses specified in this bylaw, the Agent must also find that the Stormwater Management Plan submitted with the permit application meets the following criteria:

A. the Stormwater Management Plan and the Erosion and Sediment Control Plan are consistent with the Purposes and Objectives of this Bylaw in Section 1;
B. the Stormwater Management Plan meets the Performance Standards described in Section 6;
C. the Erosion and Sediment Control plan must meet the Design Requirements in Section 7.

5. Designated Agent Action

The Designated Agent's action, rendered in writing, shall consist of either:

A. Approval of the Stormwater Management Permit Application based upon determination that the proposed plan meets the purposes in Section 1 and the standards in Section 6 and will adequately protect the water resources of the community and is in compliance with the requirements set forth in this by-law;
B. Approval of the Stormwater Management Permit Application subject to any conditions, modifications or restrictions required by the Board or Designated Agent which will ensure that the project meets the purposes in Section 1 and the standards in Section 6 and adequately protects water resources, set forth in this by-law;
C. Disapproval of the Stormwater Management Permit Application based upon a determination that the proposed plan, as submitted, does not meet the purposes in Section 1 and the standards in 6 or adequately protect water resources, as set forth in this by-law.

Failure of the Designated Agent to take final action upon an Application within 90 days shall be deemed to be approval of said Application unless extended by mutual agreement. Upon certification by the Town Clerk that the allowed time has passed without Designated Agent action, the Designated Agent must issue a Stormwater Management Permit.

6. Inspections

No plan will be approved without adequate provision for inspection of the property before development activity commences. The applicant shall arrange with the Designated Agent for scheduling inspections, or upon request by the Designated Agent, shall have a qualified third-party inspector, as determined by the Designated Agent, perform the inspections and submit a detailed report as to their findings. A qualified inspector is a person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention, who possesses the skills to assess conditions at the construction site that could impact stormwater quality, and the skills to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit. The applicant shall arrange with the Designated Agent for scheduling the following inspections:

A. Initial inspection: prior to approval of any plan
B. Erosion Control Inspections: after site clearing, rough grading and final grading to ensure erosion control practices are in accord with the plan.
C. Bury inspection: prior to backfilling of any underground drainage or stormwater conveyance structures;
D. Final Inspection: when all work, including construction of stormwater management facilities and landscaping have been completed. Final inspection shall include a full inspection of all stormwater pipes installed provided by the applicant.

The Designated Agent shall inspect the work and either approve it or notify the applicant in writing in what respects there has been a failure to comply with the requirements of the approved plan. Any portion of the work which does not comply shall be promptly corrected by the applicant or the applicant will be subject to the bonding provisions of Section 9 or the penalty provisions of Section 10. The Town may conduct random inspections to ensure effective control of erosion and sedimentation during all phases of construction.

7. Right-of-Entry for Inspection

When any new drainage control facility is installed on private property, or when any new connection is made between private property and a public drainage control system, the filing of an application shall be deemed as the property owner's permission to the Designated Agent for the right to enter the property at reasonable times and in a reasonable manner for the purpose of the inspection. This includes the right to enter a property when it has a reasonable basis to believe that a violation of this bylaw is occurring or has occurred, and to enter when necessary for abatement of a public nuisance or correction of a violation of this bylaw.

8. Application Review Fees

The fee for review of any land development application shall be based on the amount of land to be disturbed and site complexity. The fee structure shall be established by the Hampden Board of Selectmen. All of the monetary contributions shall be credited to the General Fund or Revolving Stormwater Fund, and shall be made prior to issuance of any building permit for development.

The Board of Selectmen, Designated Agent, Planning Board, and Conservation Commission are authorized to retain a Registered Professional Engineer (PE) or other professional consultant to advise the Board of , Designated Agent, Planning Board, and Conservation Commission on any or all aspects of the application and/or the project's compliance with conditions of a Review or Permit. The Board of Selectmen, Designated Agent, Planning Board, and Conservation Commission may require the applicant to pay reasonable costs to be incurred by the Board of Selectmen, Designated Agent, Planning Board, and Conservation Commission for the employment of outside consultants pursuant to stormwater management regulations as authorized by G.L. c. 44, § 53G.

SECTION 5. THE STORMWATER MANAGEMENT AND EROSION CONTROL PLAN

1. Contents of the Stormwater Management and Erosion Control Plan

The application for a stormwater management permit shall consist of submittal of a stormwater management and erosion control plan, prepared by a professional engineer licensed by the Commonwealth of Massachusetts, which meets the design requirements provided by this Bylaw. The plan shall include sufficient information to evaluate the environmental characteristics of the affected areas, the potential impacts of the proposed development on water resources; and the effectiveness and acceptability of measures proposed for managing stormwater runoff. The Plan must be designed to meet the Massachusetts Stormwater Management Standards as set forth in Section 6 of this bylaw and the Massachusetts Department of Environmental Protection Stormwater Handbook Volumes 1 and 2. The applicant shall certify on the drawings that all clearing, grading, drainage, construction, and development shall be conducted in strict accordance with the plan. The minimum information submitted for support of a stormwater management plan shall be as follows:

A. A locus map,
B. The existing zoning, and land use at the site,
C. The proposed land use,
D. The location(s) of existing and proposed easements,
E. The location of existing and proposed utilities,
F. The site's existing & proposed topography with contours at 2 foot intervals,
G. The existing site hydrology,
H. A description & delineation of existing stormwater conveyances, impoundments, and wetlands on or adjacent to the site or into which storm water flows.
I. A delineation of 100-year flood plains, if applicable
J. Estimated seasonal high groundwater elevation (November to April) in areas to be used for storm water retention, detention, or infiltration.
K. The existing and proposed vegetation and ground surfaces with runoff coefficient for each,
L. A drainage area map showing pre and post construction watershed boundaries, drainage area and storm water flow paths,
M. A description and drawings of all components of the proposed drainage system including:
    (1) locations, cross sections, and profiles of all brooks, streams, drainage swales and their method of stabilization,
    (2) all measures for the detention, retention or infiltration of water,
    (3) all measures for the protection of water quality,
    (4) the structural details for all components of the proposed drainage systems and storm water management facilities,
    (5) notes on drawings specifying materials to be used, construction specifications, and typical.
    (6) expected hydrology with supporting calculations.
    (7) proposed improvements including location of buildings or other structures, impervious surfaces, and drainage facilities, if applicable,
    (8) a description of construction and waste materials expected to be stored on-site, and a description of controls to reduce pollutants from these materials including storage practices to minimize exposure of the materials to storm water, and spill prevention and response.
    (9) timing, schedules, and sequence of development including clearing, stripping, rough grading, construction, final grading, and vegetative stabilization.
    (10) a maintenance schedule for the period of construction.

SECTION 6. STORMWATER MANAGEMENT PERFORMANCE STANDARDS

1. Minimum Control Requirements

Projects must meet the Small MS4 General Permit requirements and Massachusetts Stormwater Management Standards as follows.

A. No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or water of the Commonwealth.
B. Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.
C. Loss of annual recharge to groundwater should be minimized through the use of infiltration measures to the maximum extent practicable. The annual recharge from the post-development site should approximate the annual recharge rate from the pre-development or existing site conditions, based on soil types.

D. Stormwater management systems on new development shall be designed to meet an average annual pollutant removal equivalent to 90% of the average annual load of Total Suspended Solids (TSS) related to the total post-construction impervious area on the site AND 60% of the average annual load of Total Phosphorus (TP) related to the total post-construction impervious surface area on the site. Average annual pollutant removal requirements are achieved through one of the following methods:
   (1) Installing BMPs that meet the pollutant removal percentages based on calculations developed consistent with EPA Region 1's BMP Accounting and Tracking Tool (2016) 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, then 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; or
   (2) Retaining 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; or
   (3) Meeting a combination of retention and treatment that achieves the above standards; or
   (4) Utilizing offsite mitigation that meets the above standards within the same USGS HUC 12 as the new development site.

E. Stormwater management systems on redevelopment sites shall be designed to meet an average annual pollutant removal equivalent to 80% of the average annual post-construction load of TSS related to the total post-construction impervious area on the site AND 50% of the average annual load of TP related to the total post-construction impervious surface area on the site. Average annual pollutant removal requirements are achieved through one of the following methods:
   (1) Installing BMPs that meet the pollutant removal percentages based on calculations developed consistent with EPA Region 1's BMP Accounting and Tracking Tool (2016) 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, then 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; or
   (2) Retaining the volume of runoff equivalent to, or greater than, 0.8 inch multiplied by the total post-construction impervious surface area on the redeveloped site; or
   (3) Meeting a combination of retention and treatment that achieves the above standards; or
   (4) Utilizing offsite mitigation that meets the above standards within the same USGS HUC 12 as the redevelopment site.

F. 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 unless infeasible and are exempt from 6.E. 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 6.E.

G. Stormwater discharges from areas with higher potential pollutant loads require the use of specific stormwater management BMPs (see Massachusetts Stormwater Handbook Volume 1: Overview of Massachusetts Stormwater Standards). The use of infiltration practices without pretreatment is prohibited.

H. Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for critical areas (see Massachusetts Stormwater Handbook Volume 1: Overview of Massachusetts Stormwater Standards). Critical areas are Outstanding Resource Waters (ORWs), swimming beaches, cold water fisheries and recharge areas for public water supplies.

I. Erosion and sediment controls must be implemented to prevent impacts during disturbance and construction activities.

J. All stormwater management systems must have an operation and maintenance plan to ensure that systems function as designed.

K. New development and redevelopment stormwater management BMPs should be optimized for nitrogen removal and removal of other pollutants in accordance with the Small MS4 General Permit where discharges are to a water listed as impaired on the Massachusetts Integrated List of Waters published by Massachusetts Department of Environmental Protection.

L. When the proposed discharge may have an impact upon a sensitive receptor, including streams or storm sewers, the Designated Agent may require an increase in these minimum requirements, based on existing stormwater system capacity.

2. Stormwater Management Measures

A. Stormwater management measures shall be required to satisfy the minimum control requirements and shall be implemented in the following order of preference:

1. Infiltration, flow attenuation, and pollutant removal of runoff on-site to existing areas with grass, trees, and similar vegetation and through the use of open vegetated swales and natural depressions;
2. Use of stormwater on-site to replace water used in industrial processes or for irrigation;
3. Stormwater detention structures for the temporary storage of runoff which is designed so as not to create a permanent pool of water; and
4. Stormwater retention structures for the permanent storage of runoff by means of a permanent pool of water.
5. Retention and evaporation of stormwater on rooftops or in parking lots;

B. Infiltration practices shall be utilized to reduce runoff volume increases. A combination of successive practices may be used to achieve the applicable minimum control requirements. Justification shall be provided by the applicant for rejecting each practice based on site conditions.

C. Best Management Practices shall be employed to minimize pollutants in stormwater runoff prior to discharge into a separate storm drainage system or water body.

D. All stormwater management facilities shall be designed to provide an emergency overflow system, and incorporate measures to provide a non-erosive velocity of flow along its length and at any outfall.

E. The designed release rate of any stormwater structure shall be modified if any increase in flooding or stream channel erosion would result at a downstream dam, highway, structure, or normal point of restricted stream flow.

3. Specific Design Criteria

Additional policy, criteria, and information including specifications and design standards may be found in the Stormwater Design Manual.

A. Low Impact Development (LID) site planning and design strategies must be implemented unless infeasible in order to reduce the discharge of stormwater from development sites, per the Small MS4 General Permit.

B. Infiltration systems

1. Infiltration systems shall be equipped with clean stone and or filter fabric adjacent to the soil or other sediment removal mechanisms;
2. Infiltration systems greater than 3 feet deep shall be located at least l0 feet from basement walls;
3. Due to the potential for groundwater contamination from dry wells, they shall not be an acceptable method for management of runoff containing pollutants;
4. Infiltration systems designed to handle runoff from commercial or industrial impervious parking areas shall be a minimum of 100 feet from any drinking water supply well;
5. Infiltration systems shall not be used as sediment control basins during construction unless specific plans are included to restore or improve the basin surface;
6. Infiltration basins shall be constructed with a three foot minimum separation between the bottom of the structure and the seasonal high groundwater elevation, as determined by a certified soil evaluator; and
7. Provisions shall be made for safe overflow passage, in the event of a storm which exceeds the capacity of an infiltration system.

C. Retention and detention ponds shall be designed and constructed in accordance with the criteria of the Stormwater Handbook, Volume Two: Technical Guide for Compliance with Massachusetts Stormwater Management Standard February, 2008, Massachusetts Department of Environmental Protection, as updated or amended).

D. The applicant shall give consideration in any plan to incorporating the use of natural topography and land cover such as natural swales, and depressions as they exist prior to development to the degree that they can accommodate the additional flow of water.

E. The Designated Agent shall give preference to the use of swales in place of the traditional use of curbs and gutters based on a case by case review of stormwater management plans.

F. The applicant shall consider public safety in the design of any stormwater facilities. The banks of detention, retention, and infiltration basins shall be sloped at a gentle grade into the water as a safeguard against personal injury, to encourage the growth of vegetation and to allow the alternate flooding and exposure of areas along the shore. Basins shall have a 4:1 slope to a depth two feet below the control elevation. Side slopes must be stabilized and planted with vegetation to prevent

erosion and provide pollutant removal. The banks of detention and retention areas shall be designed with sinuous rather than straight shorelines so that the length of the shoreline is maximized, thus offering more space for the growth of vegetation;

G. Where a stormwater management plan involves direction of some or all runoff off of the site, it shall be the responsibility of the applicant to obtain from adjacent property owners a easements or other necessary property interests concerning flowage of water. Approval of a stormwater management plan does not create or affect any such rights.

H. All applicants for projects which involve the storage or use of hazardous chemicals shall incorporate handling and storage "best management practices" that prevent such chemicals from contaminating runoff discharged from a site into infiltration systems, receiving water bodies or storm drains, and shall include a list of such chemicals in the application.

I. Runoff from parking lots shall be treated by oil and water separators or other controls to remove oil and sediment;

J. The basic design criteria methodologies, and construction specifications, subject to the approval of the Designated Agent, shall be consistent with, or more stringent than, the most current edition of the Stormwater Handbook, Volume 2: Technical Guide for Compliance with Massachusetts Stormwater Management Standard (February, 2008, Massachusetts Department of Environmental Protection, as updated or amended).

SECTION 7. DESIGN REQUIREMENTS FOR EROSION AND SEDIMENT CONTROL PLAN

1. The design requirements of the Erosion and Sediment Control Plan are:

A. Minimize total area of disturbance
B. Sequence activities to minimize simultaneous areas of disturbance.
C. Minimize peak rate of runoff in accordance with the Massachusetts Department of Environmental Protection Stormwater Management Standards.
D. Minimize soil erosion and control sedimentation during construction. Prevention of erosion is preferred over sedimentation control.
E. Divert uncontaminated water around disturbed areas
F. Maximize groundwater recharge.
G. Install, and maintain all Erosion and Sediment Control measures in accordance with the manufacturers and designers specifications and good engineering practices
H. Prevent off-site transport of sediment.
I. Protect and manage on and off-site material storage areas (overburden and stockpiles of dirt, borrow areas, or other areas used solely by the permitted project are considered a part of the project).
J. Comply with applicable Federal, State and local laws and regulations including waste disposal, sanitary sewer or septic system regulations, and air quality requirements, including dust control.
K. Prevent adverse impact from the proposed activities to habitats mapped by the Massachusetts Natural Heritage & Endangered Species Program as Endangered, Threatened or of Special concern, Estimated Habitats of Rare Wildlife and Certified Vernal Pools, and Priority Habitats of Rare Species.
L. Institute interim and permanent stabilization measures. The measures shall be instituted on a disturbed area as soon as practicable but no more than 14 days after construction activity has temporarily or permanently ceased on that portion of the site.
M. Properly manage on-site construction and waste materials. Construction site operators shall control wastes, including but not limited to, discarded building materials, concrete truck washout, chemicals, litter, and sanitary wastes. These wastes may not be discharged to the MS4.
N. Prevent off-site vehicle tracking of sediments.

SECTION 8. MAINTENANCE

1. Operation, Maintenance and Inspection Agreement

A. Prior to issuance of any building permit for which stormwater management is required, the Designated Agent shall require the applicant or owner to execute an operation, maintenance and inspection agreement binding on all subsequent owners of land served by the private stormwater management

facility. The agreement shall be designed to ensure that water quality standards are met in all seasons and throughout the life of the system. Such agreement shall provide for access to the facility at reasonable times for regular inspections by the Town or its authorized representative and for regular or special assessments of property owners to ensure that the facility is maintained in proper working condition to meet design standards and any provision established. The agreement shall include:

(1) The name(s) of the owner(s) for all components of the system.
(2) Maintenance agreements that specify:
  (a) The names and addresses of the person(s) responsible for operation and maintenance.
  (b) The person(s) responsible for financing maintenance and emergency repairs.
  (c) A detailed Maintenance Schedule for all drainage structures, including swales and ponds.
  (d) A list of easements with the purpose and location of each.
  (e) The signature(s) of the owner(s).
(3) Stormwater management easements as necessary for:
  (a) Access for facility inspections and maintenance.
  (b) Preservation of stormwater runoff conveyance, infiltration, and detention areas and facilities, including flood routes for the 100-year storm event.
  (c) Direct maintenance access by heavy equipment to structures requiring regular cleanout.
(4) Stormwater management easement requirements:
  (a) The purpose of each easement shall be specified in the maintenance agreement signed by the property owner.
  (b) Stormwater management easements are required for all areas used for off-site stormwater control, unless a waiver is granted by the Town.
  (c) Easements shall be recorded with the Registry of Deeds prior to issuance of a Certificate of Completion.
(5) Changes to Operation and Maintenance Plans
  (a) The owner(s) of the stormwater management system must notify the Designated Agent of changes in ownership or assignment of financial responsibility.
  (b) The maintenance schedule in the Maintenance Agreement may be amended to achieve the purposes of this by-law by mutual agreement of the Designated Agent and the Responsible Parties. Amendments must be in writing and signed by all Responsible Parties. Responsible Parties must include owner(s), persons with financial responsibility, and persons with operational responsibility.

B. The agreement shall be recorded by the applicant and/or owner in the land records of the Registry of Deeds.

C. The agreement shall also provide that, if after notice by the Designated Agent to correct a violation requiring maintenance work, satisfactory corrections are not made by the owner(s) within thirty days, the Designated Agent may perform all necessary work to place the facility in proper working condition. The owner(s) of the facility shall be assessed the cost of the work and any penalties.

2. Maintenance Responsibility

A. The owner of the property on which work has been done pursuant to this Bylaw for private stormwater management facilities, or any other person or agent in control of such property, shall maintain in good condition and promptly repair and restore all grade surfaces, walls, drains, dams and structures, vegetation, erosion and sediment control measures and other protective devices. Such repairs or restoration and maintenance shall be in accordance with approved plans.

B. A maintenance schedule shall be developed for the life of any stormwater management facility and shall state the maintenance to be completed, the time period for completion, and who shall be legally responsible to perform the maintenance. This maintenance schedule shall be printed on the stormwater management plan.

C. The owner of the property on which work has been done pursuant to this Bylaw for private stormwater management facilities, or any other person or agent in control of such property, shall submit, by February 1 of each calendar year, an annual report to the Board of Selectman, detailing maintenance and inspection activities conducted in conjunction with the stormwater management facilities.

SECTION 9. PERFORMANCE BOND

The Designated Agent or the appropriate Board or Commission shall require from the developer a surety or cash bond, irrevocable letter of credit, or other means of security acceptable to the Designated Agent prior to the

issuance of any building permit for the construction of a development requiring a stormwater management facility. The amount of the security shall not be less than the total estimated construction cost of the stormwater management facility. The bond so required in this section shall include provisions relative to forfeiture for failure to complete work specified in the approved stormwater management plan, compliance with all of the provisions of this Bylaw and other applicable laws and regulations, and any time limitations. The bond shall not be fully released without a final inspection of the completed work by the Designated Agent, submission of "As-built" plans, and certification of completion by the Designated Agent of the stormwater management facilities being in compliance with the approved plan and the provisions of this Bylaw. As-built plans shall be provided no later than two (2) years after completion of construction projects.

SECTION 10. ENFORCEMENT AND PENALTIES

1. Violations
   Any development activity that has commenced or is conducted contrary to this Bylaw may be restrained by injunction or otherwise abated in a manner provided by law.

2. Notice of Violation
   When the Designated Agent determines that an activity is not being carried out in accordance with the requirements of this-Bylaw, it shall issue a written notice of violation to the owner of the property. The notice of violation shall contain:
   A. the name and address of the owner applicant;
   B. the address when available or the description of the building, structure, or land upon which the violation is occurring;
   C. a statement specifying the nature of the violation;
   D. a description of the remedial measures necessary to bring the development activity into compliance with this Bylaw and a time schedule for the completion of such remedial action;
   E. a statement of the penalty or penalties that shall or may be assessed against the person to whom the notice of violation is directed;
   F. a statement that the determination of violation may be appealed to the municipality by filing a written notice of appeal within fifteen (15) days of service of notice of violation.

3. Stop Work Orders
   Persons receiving a notice of violations will be required to halt all construction activities. This “stop work order” will be in effect until the Designated Agent confirms that the development activity is in compliance and the violation has been satisfactorily addressed. Failure to address a notice of violation in a timely manner can result in civil, criminal, or monetary penalties in accordance with the enforcement measures authorized in this Bylaw.

4. Criminal and Civil Penalties
   Any person who violates any provision of this bylaw, valid regulation, or the terms or conditions in any permit or order prescribed or issued thereunder, shall be subject to a fine not to exceed $300.00 for each day such violation occurs or continues or subject to a civil penalty, which may be assessed in an action brought on behalf of the Town in any court of competent jurisdiction.

5. Non-Criminal Disposition
   As an alternative to criminal prosecution or civil action, the Town of Hampden may elect to utilize the non-criminal disposition procedure set forth in the Town of Hampden General Bylaws, Chapter XI. The Designated Agent shall be the enforcing entity. Each day or part thereof that such violation occurs or continues shall constitute a separate offense, applicable penalties to apply.

6. Restoration of Lands

Any violator may be required to restore land to its undisturbed condition. In the event that restoration is not undertaken within a reasonable time after notice, the Designated Agent may take necessary corrective action, the cost of which shall become a lien upon the property until paid. Within thirty (30) days after the Designated Agent completes all measures necessary for corrective action, the violator and property owner will be notified of the costs incurred by the Town, including administrative costs. The violator or property owner may file a written protest objecting to the amount or basis of cost with the Designated Agent within thirty (30) days of receipt of the notification of the costs incurred. If the amount due is not received by the expiration of the time in which to file a protest or within thirty (30) days following a decision of the Designated Agent affirming or reducing the costs, or from a final decision of a court of competent jurisdiction, the cost shall become a special assessment against the property owner of said costs. Interest shall begin to accrue on any unpaid costs at the statutory rate provided in M.G.L. Chapter 59, s 57 after the thirtieth (30) day at which the costs first become due.

7. Holds on Occupancy Permits

Occupation permits will not be granted until corrections to all stormwater practices have been made and accepted by the Designated Agent.

8. Entry to Perform Duties Under this Bylaw

To the extent permitted by state law, or if authorized by the owner or other party in control of the property, Designated Agent may enter upon privately owned property for the purpose of performing their duties under this bylaw and regulations and may make or cause to be made such examinations, surveys or sampling as the Designated Agent deems reasonably necessary

9. Appeals

The decisions or orders of the Designated Agent shall be final. Further relief shall be to a court of competent jurisdiction.

10. Remedies Not Exclusive

The remedies listed in this bylaw are not exclusive of any other remedies available under any applicable federal, state, or local bylaw.

SECTION 11. SEVERABILITY

The invalidity of any section or provision of this Bylaw shall not invalidate any other section or provision thereof.

Town of Hampden Priority Outfall and Catchment Lists

as updated in June of 2021

Town of Hampden Updated Outfall Ranking (2021)

Outfall ID	Preliminary Outfall Rank	Within Zone I WHPA	Discharges to Impaired Water*	Proximity to Dense Development	Proximity to Areas with Historic High Groundwater	Revised Priority Ranking for Catchment Investigation	Receiving Waterbody
1_OF	High	Yes				Low	Outside Receiving
2_OF	Low					Low	Watchaug Brook
3_OF	Low					Low	Wetland to Tributary to Watchaug Brook
4_OF	Low					Low	Isolated Wetland off of Andrew Circle
5_OF	Low					Low	Isolated Wetland off of Andrew Circle
6_OF	Low					Low	Wetland to Mill Pond
7_OF	Low					Low	Outside Receiving
8_OF	Low					Low	Isolated Wetland off of Circle View Drive
9_OF	Low					Low	Wetland to Tributary to South Branch Mill River
10_OF	Low					Low	Outside Receiving
11_OF	Low					Low	Outside Receiving
12_OF	High				Yes, Crestwood Drive	Low	Outside Receiving
13_OF	Low					High	Tributary to South Branch Mill River
14_OF	High		Yes		Yes, Erica Circle	High	Tributary to Wetland to Scantic River
15_OF	Low					Low	Outside Receiving
16_OF	High				Yes, Fernwood Drive	Low	Wetland to Tributary to South Branch Mill River
17_OF	High				Yes, Fernwood Drive	Low	Wetland to Tributary to South Branch Mill River
18_OF	High				Yes, Fernwood Drive	Low	Wetland to Tributary to South Branch Mill River
19_OF	Low		Yes			High	Tributary to Wetland to Scantic River
20_OF	High		Yes		Yes, Martin Farms Road	High	Tributary to Wetland to Scantic River
21_OF	Low		Yes			High	Wetland to Scantic River
22_OF	Low					Low	Wetland to Tributary to South Branch Mill River
23_OF	Low					Low	Wetland to Tributary to Watchaug Brook
24_OF	Low					Low	Tributary to Wetland to Watchaug Brook
25_OF	Low		Yes			High	Tributary to Wetland to Scantic River
26_OF	High		Yes			High	Scantic River
27_OF	Low					Low	Outside Receiving
28_OF	High				Yes, Session Drive	Low	Outside Receiving
29_OF	Low					Low	Tributary to Wetland to South Branch Mill River
74_OF	Low					Low	Isolated Wetland off of Stony Hill Road
75_OF	Low					Low	Outside Receiving
76_OF	Low					Low	Wetland to South Branch Mill River
77_OF	Low					Low	South Branch Mill River
78_OF	Low					Low	Outside Receiving
79_OF	Low					Low	Wetland to South Branch Mill River
80_OF	Low					Low	Outside Receiving
81_OF	Low					Low	Outside Receiving
82_OF	Low					Low	Outside Receiving
83_OF	Low					Low	Tributary to South Branch Mill River
84_OF	Low					Low	Tributary to South Branch Mill River
87_OF	Low					Low	Tributary to South Branch Mill River
88_OF	Low					Low	Tributary to Sawmill Brook
89_OF	Low					Low	Outside Receiving
91_OF	High			Yes, Raymond Drive		Low	Tributary to Watchaug Brook
92_OF	High			Yes, Raymond Drive		Low	Outside Receiving
93_OF	Low					Low	Tributary to Wetland to Watchaug Brook
94_OF	Low					Low	Outside Receiving
95_OF	Low					Low	Outside Receiving
96_OF	Low					Low	Outside Receiving
97_OF	Low					Low	Outside Receiving
98_OF	High		Yes			High	Scantic River
99_OF	Low		Yes			High	Tributary to Wetland to Scantic River
103_OF	Low					Low	Outside Receiving
104_OF	High				Yes, Genevieve Drive	Low	Isolated Wetland off of Genevieve Drive
105_OF	Low					Low	Tributary to Wetland to Scantic River
106_OF	Low					Low	Wetland to Scantic River

Town of Hampden Updated Outfall Ranking (2021)

Outfall ID	Preliminary Outfall Rank	Within Zone I WHPA	Discharges to Impaired Water*	Proximity to Dense Development	Proximity to Areas with Historic High Groundwater	Revised Priority Ranking for Catchment Investigation	Receiving Waterbody
107_OF	Low					Low	Wetland to Tributary to Watchaug Brook
108_OF	Low					Low	Tributary to Wetland to Scantic River
109_OF	Low					Low	Wetland to Tributary to Scantic River
110_OF	Low					Low	Outside Receiving
120_OF	Low					Low	Watchaug Brook
121_OF	Low					Low	Watchaug Brook
122_OF	Low		Yes			High	Tributary to Wetland to Scantic River
123_OF	Low					Low	Outside Receiving
124_OF	Low					Low	Outside Receiving
125_OF	Low					Low	Outside Receiving
126_OF	Low					Low	Outside Receiving
128_OF	N/A					Low	Outside Receiving
129_OF	N/A					Low	Outside Receiving
130_OF	N/A					Low	Isolated Wetland off of Andrew Circle
131_OF	N/A					High	Outside Receiving
132_OF	N/A					Low	Outside Receiving
133_OF	N/A					High	Tributary to Isolated Wetland
134_OF	N/A					High	Tributary to South Branch Mill River
136_OF	N/A					Low	Tributary to South Branch Mill River
137_OF	N/A					Low	Tributary to South Branch Mill River
138_OF	N/A					High	Tributary to South Branch Mill River
139_OF	N/A					High	Tributary to South Branch Mill River
140_OF	N/A					High	Watchaug Brook
141_OF	N/A					Low	Outside Receiving
142_OF	N/A					Low	Tributary to Wetland to Skerry Brook
143_OF	N/A		Yes			High	Tributary to Wetland to Scantic River
144_OF	N/A		Yes			High	Scantic River
145_OF	N/A		Yes			Low	Tributary to Wetland to Scantic River
146_OF	N/A		Yes			Low	Tributary to Wetland to Scantic River
147_OF	N/A					Low	Outside Receiving
148_OF	N/A					Low	Tributary to Wetland to Watchaug Brook
149_OF	N/A		Yes			Low	Tributary to Wetland to Scantic River
150_OF	N/A		Yes			Low	Tributary to Wetland to Scantic River
151_OF	N/A					Low	Tributary to Wetland to South Branch Mill River
152_OF	N/A					Low	Tributary to Wetland to South Branch Mill River
153_OF	N/A		Yes			High	Tributary to Wetland to Scantic River
154_OF	N/A		Yes			High	Scantic River
155_OF	N/A		Yes			High	Scantic River

* The Scantic River segment within the Town of Hampden is listed as a Category 5 water impaired by *E. coli* in the Massachusetts Year 2016 Integrated List of Waters, but was not listed as impaired in the final Massachusetts Year 2014 Integrated List of Waters used to develop the Catchment Investigation Procedures

Town of Hampden Key Junction Manhole Mapbook for Catchment Investigations

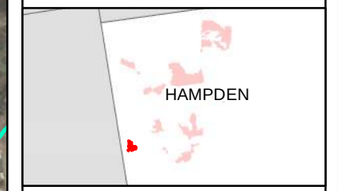
as updated in June of 2021

CATCHMENT INVESTIGATIONS

LEGEND

- Key Junction Manhole
- Key Junction Catch Basin
- Junction Catch Basin
- Non-Junction Catch Basin
- Junction Manhole
- Non-Junction Manhole
- Drain Line
- Outfall
- Outfall Catchment
- Town Boundaries

LOCUS MAP



N W E S

0 275 550

Feet

1:4,800

NOTES

1. Based on MassGIS Color Orthophotography (2019)
2. Based on the town of Hampden' Storm System GIS (2021)

Page of 1 of 10
Catchment Area of Outfall
Hampden, Massachusetts

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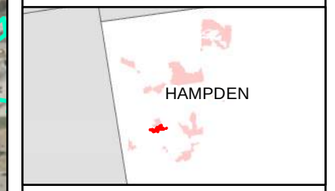
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CATCHMENT INVESTIGATIONS

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Catchment Area of Outfall
Hampden, Massachusetts

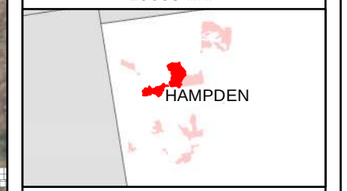
Tighe&Bond

CATCHMENT INVESTIGATIONS

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Hampden, Massachusetts

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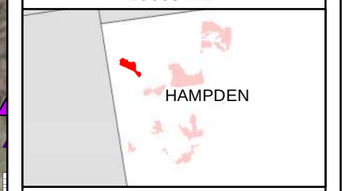
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CATCHMENT INVESTIGATIONS

LEGEND

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Hampden, Massachusetts

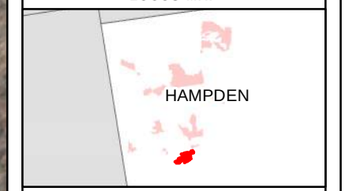
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CATCHMENT INVESTIGATIONS

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Hampden, Massachusetts

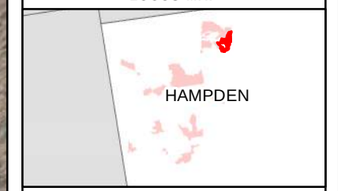
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CATCHMENT INVESTIGATIONS

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Page of 6 of 10
Catchment Area of Outfall
Hampden, Massachusetts

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WILBRAHAM
HAMPDEN

Wilbraham Road

Kelly Lane

Mount Vision Road

Forest Hills Road

Chestnut Hill Road

Valley View Drive

Echo Valley Drive

WR 58

Maple Grove rd 3

Springhouse rd 2

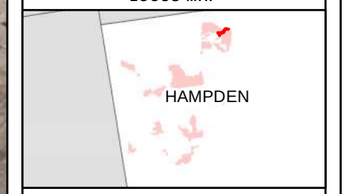
Mountain Road

CATCHMENT INVESTIGATIONS

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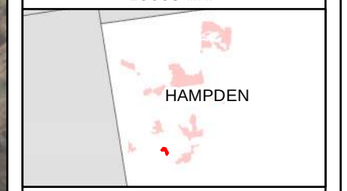
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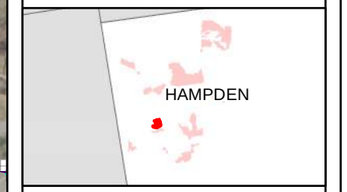
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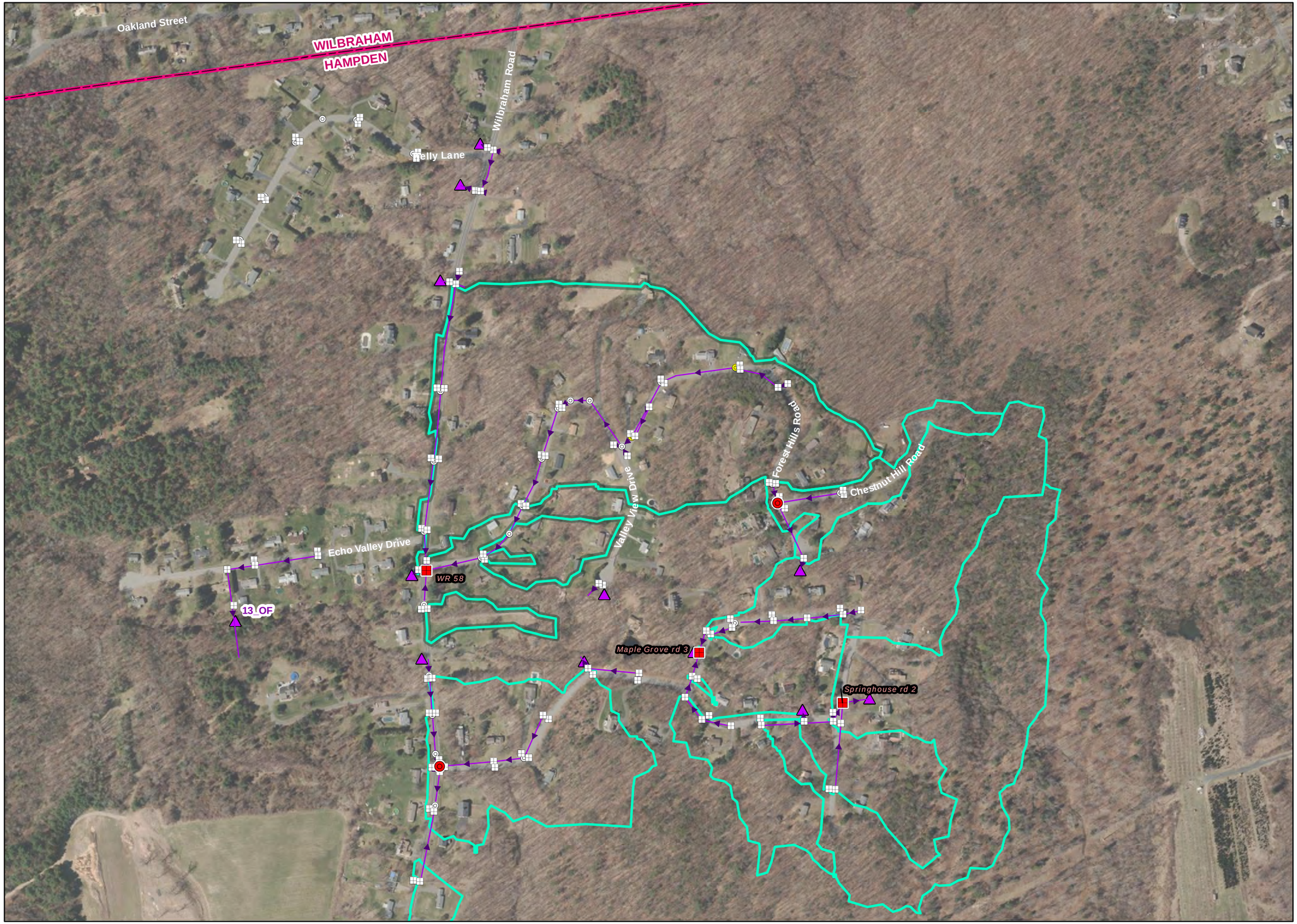
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Catchment Area of Outfall
Hampden, Massachusetts

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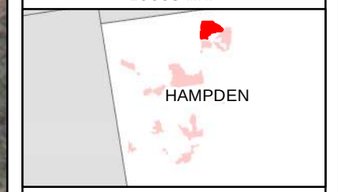


CATCHMENT INVESTIGATIONS

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Hampden, Massachusetts

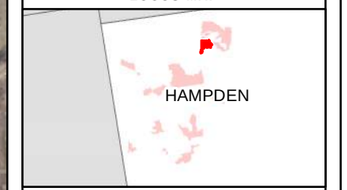
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Hampden, Massachusetts

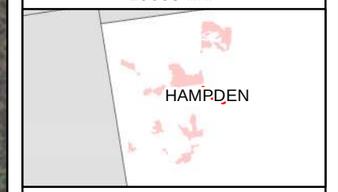
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CATCHMENT INVESTIGATIONS

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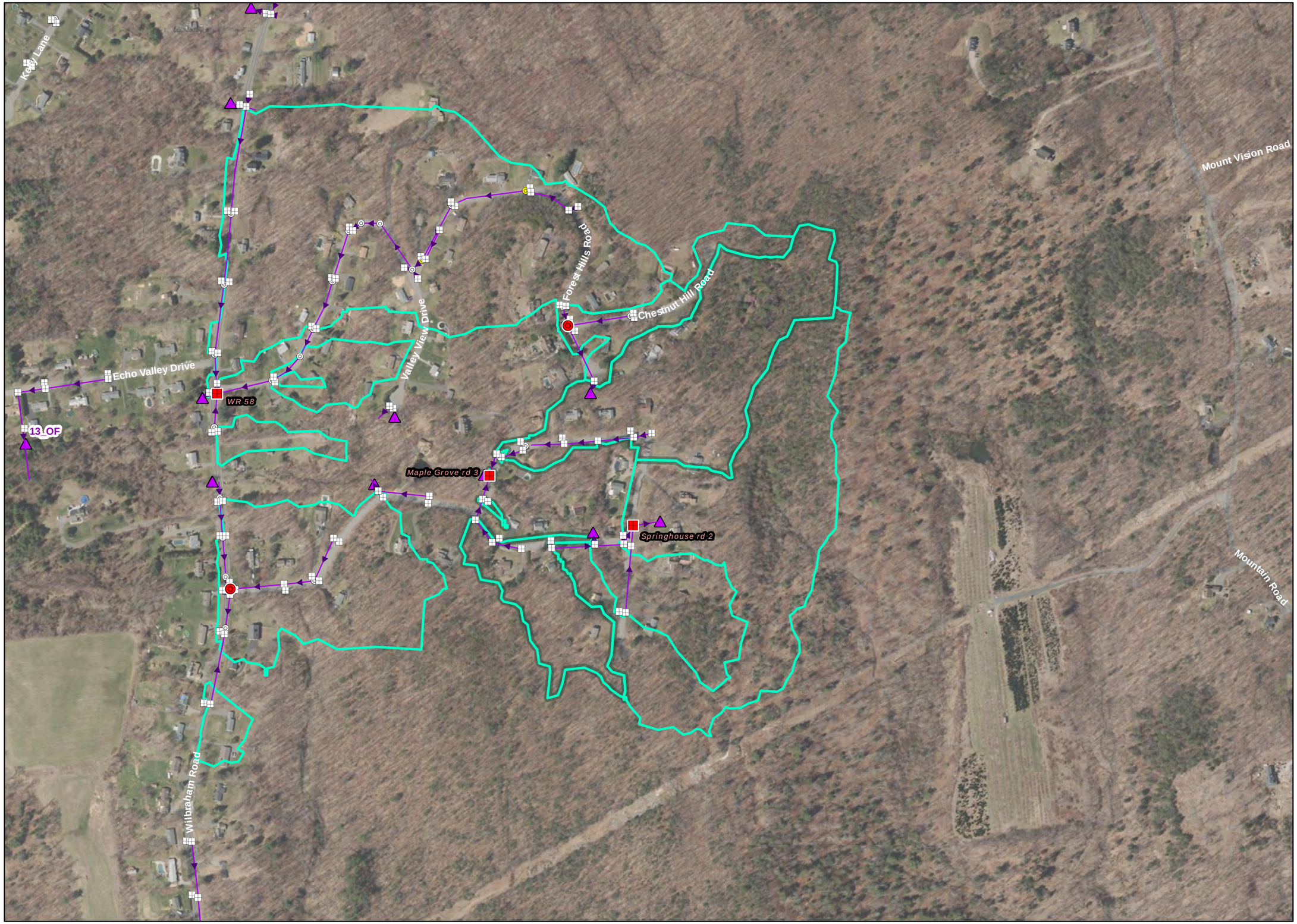
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Page of 12 of 10
Catchment Area of Outfall
Hampden, Massachusetts

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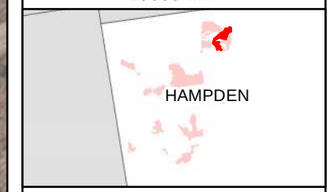


CATCHMENT INVESTIGATIONS

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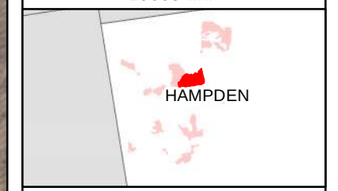
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CATCHMENT INVESTIGATIONS

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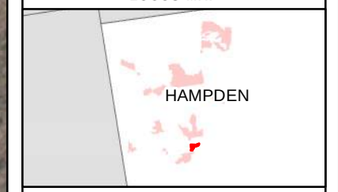
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CATCHMENT INVESTIGATIONS

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- Key Junction Catch Basin
- Junction Catch Basin
- Non-Junction Catch Basin
- Junction Manhole
- Non-Junction Manhole
- Drain Line
- Outfall
- Outfall Catchment
- Town Boundaries

LOCUS MAP



N W E S

0 275 550

Feet

1:4,800

NOTES

1. Based on MassGIS Color Orthophotography (2019)
2. Based on the town of Hampden' Storm System GIS (2021)

Catchment Area of Outfall
Hampden, Massachusetts

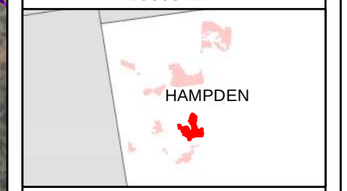
Tighe&Bond

CATCHMENT INVESTIGATIONS

LEGEND

- Key Junction Manhole
- Key Junction Catch Basin
- Junction Catch Basin
- Non-Junction Catch Basin
- Junction Manhole
- Non-Junction Manhole
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Page of 16 of 10
Catchment Area of Outfall
Hampden, Massachusetts

Tighe&Bond

Green Infrastructure Regulatory Assessment Memorandum

June 2021

Town of Hampden - Green Infrastructure Regulatory Review

TO: Town of Hampden Stormwater Committee

FROM: Tracy Adamski, AICP and Emily Tully, Tighe & Bond

COPY: Stormwater Program Files

DATE: June 2021

Background

Section 2.3.6.c. of the 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 (referred to herein as "2016 Small MS4 General Permit") requires permittees to 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

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

The following memorandum evaluates whether green infrastructure practices are allowable under appropriate site conditions in the Town of Hampden's existing bylaws and regulations, under what circumstances they are allowed, and an evaluation of barriers to use in these practices. The memo also includes a summary of recommendations for potential changes in local bylaws and regulations to make green infrastructure practices allowable, and a schedule for implementation.

Review of Existing Bylaws and Regulations

The following existing bylaws and regulations of the Town of Hampden were assessed with regard to whether green infrastructure practices such as green roofs, infiltration practices, and water harvesting devices are allowed where feasible:

- General Bylaws of the Town of Hampden Massachusetts (as amended May 14, 2018)
- Zoning Bylaws of the Town of Hampden Massachusetts (as amended October 28, 2019)
- Rules and Regulations Governing the Subdivision of Land, Hampden Massachusetts (as amended April 27, 2015)
- Wetlands Protection Bylaws, Town of Hampden Massachusetts (as amended 2004)
- Chapter XIV-A of the General Bylaws of the Town of Hampden Massachusetts, Erosion and Sediment Control for Stormwater Management (as approved at Annual Town Meeting on May 10, 2021)

General Bylaws of the Town of Hampden

The General Bylaws of the Town of Hampden were established to instruct all concerned in the conduct of the meetings and operations of its organizations.

The version of the Stormwater Management bylaw currently included within the General Bylaws (adopted April 28, 2008) Section 6. Stormwater Management Performance Standards, subsection 1. Minimum Control Requirements, part C. requires the use of infiltration measures to the maximum extent practicable. Subsection 2. Stormwater Management Measures clarifies that the most preferred stormwater management measure to be used to satisfy the minimum control requirements is infiltration is through direction of runoff on-site to existing areas with grass, trees, and similar vegetation and through the use of open vegetated swales and natural depressions. Infiltration practices are required by part B to be utilized to reduce runoff volume increases unless justification is provided by the applicant regarding the impracticability of use of such practices due to site specific conditions. The specific design criteria provided in subsection 3 are based on those from the Massachusetts Stormwater Standards Design Manual.

Although the General Bylaws include language promoting infiltration and the use of existing drainage patterns and vegetation, there are no direct references to allowing or prohibiting the use of green infrastructure such as green roofs, rain gardens, curb extensions, planter gardens, or porous and pervious pavements, low impact development (LID) techniques, or water harvesting devices such as rain barrels.

Revisions to the Erosion and Sediment Control for Stormwater Management bylaw chapter of the General Bylaws proposed for compliance with the requirements of the 2016 Small MS4 General Permit were approved at Town Meeting on May 10, 2021; references to the use of green infrastructure practices in the revised bylaw are discussed in a separate section of this memorandum.

Zoning Bylaws of the Town Hampden

The purposes of the Zoning Bylaws of the Town of Hampden are to conserve health and secure safety from fire, flood, and other dangers; prevent overcrowding of land and avoid undue concentration of population; conserve natural resources and prevent pollution of the environment; encourage the most appropriate use of land throughout the town and provide regulations to fulfill said objectives in accordance with the provisions of Chapter 40A of the General Laws of the Commonwealth of Massachusetts. The Zoning Bylaw regulates development within the Town, including identifying allowed uses and dimensional requirements for each zoning district.

Section 6.117, Special Permit Uses within the Water Supply Protection Overlay District, references stormwater infiltration practices within the context of allowable impervious area coverage of lots as follows:

1. Uses allowed by Special Permit obtained from the Planning Board:
    c. The rendering impervious of greater than 15% of the lot area or 2,500 square feet, whichever is greater, provided that a system for artificial recharge of precipitation is developed. The management of stormwater and any artificial recharge systems developed shall be designed so as not to result in the degradation of groundwater.
        (1) For commercial uses, a stormwater management plan shall be developed which provides for the artificial recharge of precipitation to groundwater, where feasible. Recharge shall be attained through site design that incorporates natural drainage patterns and vegetation, and through the use

of stormwater infiltration basins, infiltration trenches, porous pavement or similar systems. All infiltration practices shall be preceded by oil, grease, and sediment traps or other best management practices to facilitate removal of contamination.

(2) For residential uses, recharge shall be attained through site design that incorporates natural drainage patterns and vegetation. To the extent possible, stormwater runoff from rooftops, driveways, roadways and other impervious surfaces shall be routed through areas of natural vegetation and/or devices such as infiltration basins, infiltration trenches or similar systems.

Additionally, section 7.72 General Application, subsection 5. Stormwater Run-off directly allows and encourages the use of porous pavement to reduce the amount of impervious surfaces on developed sites.

The recently amended Zoning Bylaws encourage the use of porous pavement and infiltration practices, and contain language promoting the reduction of impervious area on site and placing limits on impervious area within drinking water groundwater supply recharge areas. However, the Zoning Bylaws of the Town of Hampden contain no direct references to the use of green infrastructure such as green roofs, rain gardens, rain barrels, LID techniques, or use of stormwater for non-potable purposes.

Rules and Regulations Governing the Subdivision of Land

The Town of Hampden's Rules and Regulations Governing the Subdivision of Land (referred to herein as the "Subdivision Rules and Regulations") have been enacted for the purpose of protecting the safety, convenience and welfare of the inhabitants of the Town of Hampden by regulating the laying out and construction of ways in subdivisions providing access to several lots therein, and ensuring sanitary conditions in subdivisions and in proper cases parks and open areas.

Relevant sections that address requirements related to situations in which green infrastructure could be used include section 5.1, design standards, and section 5.5, street drainage.

- Section 5.1.2 contains design standards for street width, which allow for reductions in street width that are part of an overall drainage plan to reduce impervious surface area in a subdivision and reduce runoff from the parcel if plans for safety, parking, pedestrian circulation and other factors are deemed adequate by the Planning Board to accommodate the requested reductions.
- Section 5.5 describes requirements related to street drainage design, including a requirement to recharge storm water to the maximum extent feasible rather than pipe to surface water, and to property connect new drainage systems to any existing drains in adjacent streets or easements which may exist.

The existing Subdivision Rules and Regulations promote reduction in impervious area and infiltration of stormwater, but do not directly prohibit or encourage the use of green infrastructure such as green roofs, porous or pervious pavement, LID strategies, rain gardens, or rain barrels.

Wetlands Protection Bylaws

The Wetlands Protection Bylaws were established in order to protect the wetlands, related water resources, and adjoining land areas of the Town of Hampden. Wetland values protected by the bylaw include public or private water supply, groundwater, flood control, erosion and sedimentation control, and protection of water quality.

The Wetlands Protection Bylaws contain no references to allowing or prohibiting the use of green infrastructure such as green roofs, infiltration practices such as rain gardens, curb extensions, planter gardens, or porous and pervious pavements, low impact development (LID) techniques, or water harvesting devices such as rain barrels.

Erosion and Sediment Control for Stormwater Management

Revisions to Chapter XIV-A of the General Bylaws of the Town of Hampden Massachusetts, Erosion and Sediment Control for Stormwater Management (herein referred to as the "Stormwater Management Bylaw") for compliance with the requirements of the 2016 Small MS4 General Permit were approved at Annual Town Meeting on May 10, 2021.

The revised Stormwater Management Bylaw includes the addition of an objective that stormwater runoff management will encourage the use of LID practices such as "reducing impervious cover, treating and infiltrating stormwater at the source, utilizing environmentally sensitive site design, and, the preservation of open space and natural areas, to the maximum extent practicable."

Within the Stormwater Management Bylaw, LID is defined as "a set of approaches that seeks to mimic a site's predevelopment hydrology using design techniques that infiltrate, filter, store, evaporate and detain runoff close to its source. Instead of conveying, managing and/or treating stormwater in large, end-of-pipe facilities, LID utilizes small-scale, decentralized practices that infiltrate, treat, evaporate, and transpire rain water and snow melt including bioretention areas, grassed swales, reducing impervious areas, preservation of open space, development density, lot size and configuration, street design, parking design, and other structural stormwater treatment methods."

Infiltration practices are the preferred stormwater management measures per Section 6, Stormwater Management Performance Standards, subsection 2. Stormwater Management Measures, and use of existing drainage patterns and vegetation is encouraged. The re-use of stormwater for non-potable purposes such as irrigation, or industrial processes is also described as a preferred stormwater management measure.

Section 6, Stormwater Management Performance Standards, subsection 3. Specific Design Criteria, part A states that "LID site planning and design strategies must be implemented unless infeasible in order to reduce the discharge of stormwater from development sites, per the Small MS4 General Permit."

The Stormwater Management Bylaw requires the use of LID to the extent feasible, encourages the use of infiltration practices and non-potable re-use of stormwater, but does not contain specific design criteria promoting or prohibiting the use of alternative green infrastructure practices such as green roofs, porous pavement, or rain barrels.

Recommendations and Next Steps

The Town of Hampden's recent amendments to Bylaws and Regulations have incorporated language regarding LID practices, infiltration, and using existing drainage patterns and vegetation. Opportunities and suggestions to enhance green infrastructure and LID standards for potential addition to Town bylaws and rules and regulations are provided below.

Zoning Bylaw and Site Plan Review Standards

Dimensional Requirements:

- Permit the location of bioretention areas, rain gardens, filter strips, swales, and constructed wetlands in required setback areas and in buffer strips when feasible based on site-specific conditions such as depth to groundwater table and slope.

- In rural, low-density areas, establish limits on impervious lot coverage (e.g., 15%) and permit use of pervious or porous pavement for off-street parking areas and sidewalks. Limiting impervious lot coverage is not appropriate for town centers, transit-oriented districts, and moderate density neighborhoods, where compact development should be encouraged.
- Establish regulatory controls over tree clearance and removal of mature trees/forest stands.

Open Space Developments:

- Permit flexible residential open space developments (FROSD or cluster development or conservation subdivision design) as a "by right" form of development (no special permit required). Permit flexible site design criteria such as reduced setbacks and smaller lot sizes. According to Section 7.15 of the Zoning Bylaw FROSD is allowed "by-right" in Residential Zones R-4 and R-6; however, Section 6.0 Table of Use Regulations, identifies FROSD as SPB - Use allowed by Special Permit from the Planning Board – in Residential Zones R-4 and R-6. This discrepancy should be clarified.
- Permit construction of LID stormwater management techniques (e.g., bioretention, swales, filter strips) on land held in common.

Parking Requirements:

- Permit use of permeable paving for parking stalls and spillover parking areas.
- Establish landscaping requirements for parking areas that include vegetated islands with bioretention functions.

Site Plan Requirements

- Allow bioretention areas, filter strips, swales, and constructed wetlands to count towards fulfillment of site landscaping/open space requirements.
- Permit use of pervious material for single family driveways (porous pavers, paving stones, pervious asphalt or concrete), and/or use of 'two-track' design for residential driveways.
- Allow discharge of uncontaminated rooftop runoff to lawn areas and buffers, with level spreader or other velocity reduction mechnaism.
- Allow temporary (72 hour) ponding of stormwater prior to infiltration.
- Consider allowing use of harvested rainwater and stormwater for non-potable uses, such as lawn watering.

Subdivision Rules and Regulations/Roadway Design Standards

Street Cross Sections

- Permit use of permeable paving for road shoulders/parking lanes in residential neighborhoods and for sidewalks as compatible with Americans with Disabilities Act (ADA) and Massachusetts Architectural Advisory Board (MAAB) design standards.
- Sidewalks should be designed so that the runoff is disconnected from the stormwater system (e.g., place a green strip).

Site Work

- Require contractors to re-establish permeability of soils that have been compacted by construction vehicles. For example, contractor can rototill lawn areas prior to seeding to re-establish void space (hence permeability and infiltration) of the soils.

Dead Ends

- Allow the creation of landscaped island (and bioretention cells or rain gardens) within cul-de-sacs.

Highway Department/Building Inspector

- Determine if local building codes prohibit use of permeable paving, narrow driveways, green roofs, and other LID techniques.
- Local plumbing codes should permit the use of harvested rainwater for interior non-potable uses such as toilet flushing.
- Provide opportunities for staff participation in LID workshops or conferences.
- Implement a green infrastructure or LID demonstration project on Town-owned property.
- Modify and distribute public education materials available from MassDEP and EPA regarding design, uses, and appropriate site conditions for green infrastructure such as rain gardens and porous pavement.[1] [2] [3] [4] [5]
- Participate in a rain barrel sale and distribution program such as those offered by the Great American Rain Barrel company.[6]

A joint meeting of relevant boards and commissions is recommended, including the Stormwater Committee, Conservation Commission, Highway Department, Planning Board, Board of Health, and Board of Selectmen, to discuss public education opportunities related to green infrastructure, such as development of outreach materials or installation of a demonstration project like a rain garden with educational signage, and potential revisions to bylaws and rules and regulations to incorporate language defining green infrastructure and site conditions under which the use of green infrastructure would be allowable. The joint meeting should also include development of a schedule of implementation of proposed revisions and recommended actions.

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[1] https://www.epa.gov/green-infrastructure/overcoming-barriers-green-infrastructure

[2] https://www.epa.gov/soakuptherain

[3] https://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/BMPRetrofit.pdf

[4] https://www.thinkbluemassachusetts.org/

[5] https://www.mass.gov/guides/stormwater-outreach-materials-to-help-towns-comply-with-the-ms4-permit

[6] https://www.greatamericanrainbarrel.com/

Street Design and Parking Lot Guidelines Assessment Memorandum

June 2021

Town of Hampden – Current Street Design and Parking Lot Guidelines Assessment

TO: Town of Hampden Stormwater Program Files

FROM: Tracy Adamski, AICP, Emily Tully, and Kristin Dippold, Tighe & Bond, Inc.

COPY: Donald Davenport, Chair, Town of Hampden Board of Selectmen

DATE: June 2021

Small MS4 General Permit Requirement

Section 2.3.6.b. of the United States Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NDPES) General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts (referred to herein as "2016 Small MS4 General Permit") requires permittees to develop a report assessing current street design and parking lot guidelines and other local requirements that affect the creation of impervious cover.

The following memorandum evaluates current street design and parking lot guidelines of the Town of Hampden that affect the creation of impervious cover. The assessment included review of current street design and parking lot guidelines that affect the creation of impervious cover and requirements related to stormwater management to allow the Town to determine if changes to design standards for streets and parking lots can be made to support low impact design options as required by the 2016 Small MS4 General Permit. Recommended changes to the Town's current Street Layout and Design Standards as outlined in Table 1 of this memo should be refined through collaboration with the Town's Planning Board, Department of Public Works, and Fire Department.

Review of Existing Bylaws and Regulations

The following existing bylaws and regulations of the Town of Hampden were assessed relative to requirements that affect the creation of impervious cover:

- Rules and Regulations Governing the Subdivision of Land (as revised April 27, 2015)
- Town of Hampden Zoning Bylaws (as revised October 28, 2019)

The Town of Hampden General Bylaws (as revised May 14, 2018) were reviewed, and no provisions related to street design or parking.

Rules and Regulations Governing the Subdivision of Land

The most recent revision (April 2015) of the Rules and Regulations Governing the Subdivision of Land for the Town of Hampden, Massachusetts (Subdivision Rules and Regulations) contains paved street width, cul-de-sac radius, and sidewalk requirements that affect the creation of impervious cover associated with subdivisions. The Rules and Regulations set forward street layout and design standards that regulate the location, alignment, intersections, drainage, widths, and access of the streets of Hampden.

The sections below outline the applicable standards within the Subdivision Rules and Regulations relative to the creation of impervious cover within Hampden.

Location and Alignment

1. All streets in the subdivision shall be designed so that, in the opinion of the Board, they will provide safe vehicular travel. Due consideration shall also be given by the subdivider to the following features:
    - Volume of cut and fill
    - Area over which existing vegetation will be disturbed, especially if within 200 feet of a river, wetland or waterbody, or in areas having a slope of more than 15%
    - Number of trees removed having a diameter over six inches (6")
    - Extent of waterways altered or relocated
    - Dimensions of paved areas (including streets) except as necessary to safety and convenience, especially in aquifer/recharge areas
    - Use of collector streets to avoid traffic on streets providing house frontages
    - Visual prominence of natural features of the landscape
    - Maintenance within the subdivision of runoff and vegetative cover equivalent to conditions before development

2. The proposed streets shall conform to a Master Plan as adopted by the Board

3. Provision satisfactory to the Board shall be made for the proper projection of streets, or for access to adjourning property which is not yet developed

4. Reserve strips prohibiting access to streets or adjourning property shall not be permitted, except where, in the opinion of the Board, such strips shall be in the public interest

5. Access to Arterial Street. Intersections of collector and residential streets with arterial streets will not normally be allowed at intervals of less than 450 feet. Subdivisions of 50 or more lots will be required to have more than one access to an existing arterial street which is built in conjunction with the proposed subdivision.

6. Street jogs in arterial and collector streets with centerline offsets of less than 500 feet shall not be allowed. Street jogs in residential streets with centerline offsets of less than 125 feet should be avoided.

7. A tangent at least 100 feet in length shall separate all reverse curves on major and secondary streets except where at least one radius is 500 feet or more.

8. The minimum centerline radii of curved streets shall be 100 feet for lanes and secondary streets. 150 feet shall be required for collector streets.

9. Streets shall be laid out so as to intersect as nearly as possible at right angles. No street shall intersect any other street at less than sixty degrees.

10. Property lines at street intersections shall be rounded or cut back to provide for a curb radius of not less than 25 feet.

11. Visibility from the centerline of the street shall never be less than 75 feet.

12. Access through another municipality: In case access to a subdivision crosses land in another municipality, the Board may require certification by the appropriate officials

that such access is in accordance with the zoning and subdivision requirements of such municipality, and that a legally adequate performance bond has been duly posted, and that such access is adequately improved to handle prospective traffic.

13. Access from Public Ways - All streets and/or common driveways in a subdivision wholly or partially within the Town of Hampden must be able to be reached directly (without leaving the Town of Hampden) from a public way or ways in the Town of Hampden.

Width

The Hampden Street Layout and Design Standards outline the required minimum width for two-way, paved residential streets, as shown in the table below.

TABLE 1
Minimum Width Requirements

Classification	Street Pavement Width (ft)	Right-of-Way-Width (ft)
Minor Roads and Streets	26	40
Secondary Collectory	28	50
Primary Collector	36	60
Arterial	As per state highway department design standards	As per state highway department design standards

The following standards apply:

2. Greater width shall be required by the Board when deemed necessary for present and future vehicular travel.

3. The minimum width may be reduced if approved by the Town Planning Board for the following reasons:
    - The minimum one-way width for each direction of a paired system shall be 24 feet. The minimum width for a one-way loop street shall be 24 feet.
    - Reductions which are part of an overall drainage plan to reduce the impervious surfaces in the subdivision and reduce runoff from the parcel, shall be permitted if plans for safety, parking, pedestrian circulation and other factors are deemed adequate by the Planning Board to accommodate the requested reductions.

4. Grades of streets shall be not less than 0.5%. Grades shall not be more than 6% for primary collector streets, nor more than 8% for secondary collector streets, minor roads or streets.

5. Where the grade of any street at the approach to an intersection exceeds three percent (3.0%) a leveling area shall be provided having not greater than three percent (3.0%) grades for a distance of fifty (50) feet measured from the nearest right of way line of the intersecting street.

Dead End Streets

The subdivision rules and regulations define a dead-end street as any street or system of streets which has only a single point of access to an existing street system with two or more points of access. Any such street of system of streets shall be considered a dead end regardless of size or internal circulation patterns. Any proposed street which intersects

solely with a dead-end street shall be deemed to be an extension of the dead-end street. Dead-end streets shall not exceed a length of 1,500 feet, unless, in the opinion of the Board, a greater length is desirable due to topography or other local conditions, and shall have a turnaround area or back up area, paved as required for streets, at the closed end.

Cul-de-sacs

The minimum radius for a circular turnaround shall be 75 feet for the exterior line of a street and 50 feet for paving area. No islands shall be permitted.

Access Streets

Each subdivision shall be provided with more than one street for access and exit unless in the opinion of the Planning Board the area contained in the subdivision and/or the topography of the land would not allow for more than one access and exit street.

Adequate Access from a Public Way

When the physical condition or width of a public way from which a subdivision has its access is considered by the Board to be inadequate to carry the traffic expected to be generated by such subdivision, the Board may require the applicant to dedicate a strip of land for the purpose of widening the abutting public way to a width at least as great as that required within the subdivision, and to make physical improvements to and within such public way to the same standards required within the subdivision. Any such dedication of land for purpose of way and any such work performed within such public way shall be made only with permission of the governmental agency having jurisdiction over such way, and all cost of any such widening or construction shall be borne by the applicant.

Easements

- Easements for utilities across lots or centered on rear side lot lines shall be provided where necessary, and shall be at least 20 feet wide
- Where a subdivision is traversed by a water course, drainage way, channel or stream the Board may require that there be provided a storm water easement or drainage right-of-way of adequate width to conform substantially to the lines of such water course, drainage way, channel or stream, and to provide for construction or other necessary purposes. In no case shall the width be less than 20 feet, or the side slope be steeper than two horizontal, or one vertical.
- Access easements or parcels to adjacent property shall be provided, if required by the Board, for use by emergency vehicles and for the benefit of the Town. They shall be a minimum width of 20 feet. Bikeways or walkways may satisfy this requirement.
- Slopes adjacent to roadways, natural or man-made, may be placed within easements on individual properties rather than acquired as rights-of-way.
- Lots shall be prepared and graded consistent with drainage into the subdivision, and in such manner that development of one shall not cause detrimental drainage on another or on areas outside the subdivision, to the extent permitted by law. If provisions is necessary to carry drainage to or across a lot, an easement or drainage right-of-way of a minimum width of 20 feet and proper slope shall be provided.

Protection of Natural Features

All natural features, such as trees, wooded areas, water courses, scenic points, historic spots shall be preserved as much as possible. Any clearance, backfilling, cutting, thinning or other disturbance to trees six (6) inches or over in diameter, measured four feet above finished ground level (dbh), located within the unpaved portions of the right-of-way, or other natural vegetation shall be prohibited unless deemed proper by the Board.

Any such proposed clearance shall be shown on the plan, and written reasons therefore may be required by the Board. Trees, wells or retaining walls should be installed when and as requested by the Board for suitable grading around trees.

Sediment Control

In order to reduce erosion accompanying the installation of ways, utilities and drainage, and the resultant pollution of streams, wetlands and natural drainage areas, the applicant shall submit a sediment control plan, including control methods such as berms, dikes, detention ponds, mulching and temporary sodding.

Street Drainage

- Street drainage utilizing curbs and gutters shall be designed to keep the velocity of the flow of water in the gutter below levels which are hazardous to pedestrian safety.
- Street drainage shall be installed to be fully operational at all phases of construction; catch basins, storm drains, culverts, etc., shall be installed to base coat height, then raised to final height when the top coat is applied.
- Storm drains, culverts, and related facilities shall be designed to permit the unimpeded flow of all natural water courses, to ensure adequate drainage at all low points along streets, to control erosion, and to intercept storm water run-off along streets at intervals reasonably related to the extent and grade of the area being drained. To the maximum extent feasible, storm water shall be recharged rather than piped to surface water.
- New drainage systems shall be properly connected to any existing drains in adjacent streets or easements which may exist. Where no adequate drainage system exists, or where it is inadequate, it shall be the responsibility of the subdivider to extend his system outside the subdivision in a manner specified or approved by the Board to dispose properly of all the drainage from the proposed subdivision.
- When the subdivision causes a requirement for drainage improvements outside its area, the subdivider shall be required to secure the necessary approvals and provide such improvements in the public interest.
- Where the adjacent property is not subdivided, adequate provisions shall be made for the extension of the drainage system beyond the boundaries of the subdivision, and for it to carry the additional load that may be placed on the system. This shall be done by providing drains of adequate size and at proper slopes as specified by the Planning Board in order to permit their extension to the boundaries, and the proper connection of those of future subdivisions in the adjacent area.
- Storm drains and culverts shall be a minimum of twelve inches inside diameter, and shall be greater when required by the Board. The proper drain size may be calculated by using "Manning's Formula" with a "Kutter's" "n" value of .013 for concrete pipe, and .024 for corrugated metal pipe.
- All storm drains shall be reinforced concrete of adequate strength except that in off-street locations bituminous coated, galvanized, corrugated metal pipe or pipe arch may be used if approved by the Board. Concrete pipe shall conform to the State of Massachusetts' Standard Specifications for Highways and Bridges, as amended.
- Water velocities in pipes and gutters shall be between two and ten feet per second, and not more than five feet per second on ground surfaces. All undeveloped tributary areas shall be assumed to be fully developed in accordance with the Zoning Bylaw. Consideration will be given to flatter slopes if adequate provisions are made for cleaning the pipes.

All plans having drains with slopes which will produce pipe velocities less than two feet per second, flowing full, shall be accompanied by a letter stating the reason for approval by the Planning Board or its agent, and the drain shall not be constructed until the letter has been approved.

- Grades used in Detention Basins and Retention Basins shall not exceed 3:1.
- All drainage systems shall be completely flushed and inspected within a 60 day period prior to acceptance.
- No commercial or residential buildings shall be tied into the Town of Hampden water drainage systems without approval of the Planning Board and the Highway Department.

Catch Basins

Catch basins shall be installed on both sides of the roadway on continuous grades at intervals not to exceed 300 feet, at low points and sags in the roadway, near the corners of the roadway at intersecting streets, and at other such locations as required by the Board. Such catch basins shall be provided with granite headers with storm inlets. Drain pipes shall extend through a maximum of three catch basins and, thereafter, through manholes to the point of discharge, with a manhole being required at every change in direction, slope or diameter in the drain pipes. All catch basins, except for the first three, shall discharge into the drain through a manhole. Any catch basins and manholes used shall be at least six feet deep and four feet diameter (inside measurements), with a thirty inch or greater sump below pipe invert, and shall be constructed of concrete blocks or precast concrete units. Manhole covers and grates shall be in conformance with Massachusetts DPW Specifications, designed and placed so as to cause no hazard to bicycles.

Inlets

Inlets shall have an adequate waterway opening to pass the design storm with not more than 0.2 feet of surcharge. Grates and frames shall be cast iron suitable for the loads which can occur either during the construction or afterward. Inlets shall be constructed either of brick and mortar with eight-inch thick walls, precast segmental concrete blocks not less than six-inch thick mortared in place, or of precast pipe sections. Inlets shall be set on a base of either poured concrete eight inches in thickness, or precast segmental base blocks not less than four inches in thickness. Inlets shall be used in off-street locations, and the grate frame shall be mortared in position with the top 0.2 feet below the grade of a grate if the quantity of runoff exceeds the capacity of a grate of reasonable size, as approved by the Planning Board or its agent. Inlets shall be 4.0 feet inside diameter below the corbelling, and shall not be used on drains greater than thirty inches in diameter. A shaped invert is not required, but the bottom of the inlet shall be finished at the same grade as the lowest pipe invert. At inlets where the outlet pipe is larger than the inlet pipe, the crown of the outlet pipe shall be at the same elevation or lower than the crown of the inlet pipe.

Design Analysis

A design analysis shall be submitted with each definitive plan submitted for approval. The design analysis shall include at least the following information:

- Storm Drainage System. The data shall include consideration of the entire watershed, and the calculations used in designing the drainage system including area calculations, intensity of rainfall, coefficient of runoff, time of concentration, discharge, pipe coefficients of roughness and quantity and velocity of flow under design conditions. Design sketches showing the hydraulic gradient and the energy gradient for each run of sewer pipe shall be included;

- Storm sewers and retention basins shall be based on a twenty-year frequency storm, and culverts shall be based on a fifty-year frequency storm, with consideration given to damage avoidance for a one hundred-year storm
- Any areas designed as drainage areas be tested for adequate percolation.

Curbing

Curbing shall be installed as required by the Planning Board, and may consist of granite, bituminous concrete, portland cement or other materials, depending upon factors of safety, convenience and cost. Curbs and gutters will be required when they are:

- Necessary to handle run-off for the section of the roadway to which they are applied;
- Necessary for the maintenance of the pavement and the prevention of pavement edge reveling;
- Necessary for safety;
- Curb and gutter may be eliminated along certain roadways when drainage is provided in swales which designed to reduce the rate of run-off, restore and/or supply needed water to vegetation in the street right-of-way.

Utilities and Municipal Services

Where adjacent property is not subdivided, or where all the property of the applicant is not being subdivided at the same time, provisions shall be made for the extension of the utility system by continuing the utilities the full length of streets and to the exterior limits of the subdivision at such grade and size which will, in the opinion of the Board, permit their proper extension at a later date.

Compliance with the requirements of the Standard on Water Supplies for Suburban and Rural Firefighting, National Fire Protection Association, standard 1231, and the requirements of the Fire Department shall be satisfied. A subdivision containing eight (8) building lots or more or one which adds building lots to an existing subdivision resulting in a total exceeding eight (8) building lots will be required to include a 30,000 gallon capacity fire protection storage system. In cases where a suitable natural source, as determined by the Fire Department, exists within 1500 feet of the subdivision, this provision may be waived.

Pedestrian

Sidewalks, if required by the Planning Board, shall be placed parallel to the roadway(s) providing direct access to:

- Commercial/retail facilities
- Schools
- Public recreational facilities
- Elsewhere in accordance with the pedestrian circulation system as necessary

Sidewalks may also be eliminated along one or both sides of the streets if the subdivision provides an alternative pedestrian circulation system. Ordinarily only one sidewalk will be required except on major collectors. Pedestrian-vehicular separation shall be considered where possible. Design solutions that achieve this separation shall receive priority consideration. Planting strips shall be a minimum of two feet. Walkways connecting existing trails should be created wherever reasonable, and developed in new locations.

Paths or sidewalks shall be:

- Located within the street right-of-way. However, horizontal alignment may be varied to minimize disturbance of land vegetation. If necessary a sidewalk easement shall be obtained when the sidewalk goes outside the minimum street right-of-way.
- Sidewalks shall be pitched or sloped towards the roadway to maximize run-off of water.
- Sidewalks shall have a minimum width of four feet.
- Sidewalks shall have a maximum grade of 6% and a minimum cross-grade of 0.5%.
- Sidewalks shall provide handicap access in accordance with all Federal and State guidelines, such as Massachusetts State DPW regulations.

Lots

Lots, buildings and structures involved in subdivision shall comply with the Town Zoning bylaw then in effect as varied thereunder.

Town of Hampden Zoning Bylaw

The Town of Hampden Zoning Bylaw was enacted to conserve health and secure safety from fire flood, and other dangers; to prevent overcrowding of land and avoid undue concentration of population; to conserve natural resources and prevent pollution of the environment; to encourage the most appropriate use of land throughout the town and to provide regulations to fulfill said objectives in accordance with the provisions of Chapter 40A, as revised by Chapter 808 Acts of 1975, of the General Laws of the Commonwealth of Massachusetts. The sections below outline the applicable standards in the Zoning Bylaw as it relates to street design, parking, and impervious cover.

Impervious Surfaces

Impervious surfaces are defined as materials or structures on or above the ground that do not allow precipitation to infiltrate the underlying soil. Standards as it relates to impervious surfaces include:

- Ridgeline and Hillside Development Standards - All run-off from impervious surfaces shall be recharged on the site by being diverted to storm water infiltration basins covered with natural vegetation. Storm water infiltration basins must be designed to handle a 25-year storm. Dry wells shall be used only where other methods are infeasible, and shall be preceded by oil, grease, and sediment traps to facilitate removal of contamination. Any and all recharge areas shall be permanently maintained in full working order by the owner.
- For commercial and industrial uses, to the extent feasible, run-off impervious surface shall be recharged on the site by stormwater infiltration basins or similar systems covered with natural vegetation. Such run-off shall not be discharged directly to rivers, streams, or other surface water bodies. Dry wells shall be used only where other methods are infeasible. All such basins and wells shall be preceded by oil, grease, and sediment traps to facilitate removal of contamination. All recharge areas shall be permanently maintained in full working order by the owner(s). Infiltration systems greater than 3 feet deep shall be located at least 100 feet from drinking water wells, and shall be situated at least 10 feet down-gradient and 100 feet up-gradient from building foundations to avoid seepage problems. Infiltration basins and trenches shall be constructed with a three-foot minimum separation between the bottom of the structure and maximum groundwater elevation.

- Water Supply Protection Overlay District - The rendering impervious of greater than 15% of the area of 2,500 square feet whichever is greater, provided that a system for artificial recharge of precipitation is developed. The management of stormwater and any artificial recharge systems developed shall be designed so as not to result in the degradation of groundwater.
- Residential Uses - To the extent possible, stormwater runoff from rooftops, driveways, roadways and other impervious surfaces shall be routed through areas of natural vegetation and/or devices such as infiltration basins, infiltration trenches or similar systems.
- The rate of surface run-off from a site shall not be increased after construction. If needed to meet this requirement and to maximize groundwater recharge, increased run-off from impervious surfaces shall be recharged on site by being diverted to vegetated surfaces for infiltration or through the use of detention ponds. Dry wells shall be used only where other methods are infeasible and shall require oil, grease, and sediment traps to facilitate removal of contaminants.
- The use of proven, alternative paving systems, such as porous paving, is highly encouraged to reduce the amount of impervious surface on developed sites.
- In residential zoning, the maximum impervious surface coverage of buildable land shall be 25%.

Parking
Standards as they relate to parking include:

- Off street parking ratio shall not be less than one space for each two dwelling units.
- Two parking spaces per family unit must be provided in the rear of the front setback line, and in no case, may the parking area be within 20 feet of any lot line.
- Parking space sizes shall be a minimum of 300 square feet of net standing and maneuvering area, (250 square feet if area is enclosed on three (3) or more sides) exclusive of drives and other access ways, shall be considered one (1) off-street parking space. However, a driveway may be considered the required parking space for a residential dwelling.
- Parking lots, if paved, shall have a run-off absorption area of turf or gravel. They shall be sloped to provide maximum absorption and minimum run-off.
- All off-street parking areas and loading areas including drives and other access ways, other than those provided for residential dwellings, shall be paved as specified by the Hampden Building Code. Parking lots, if paved, shall have a run-off absorption area of turf or gravel and shall be sloped to provide maximum absorption and minimum run-off.
- No less than fifteen (15) percent of the area of a parking lot, not including the perimeter area, shall be permanently landscaped using planting strips, planting diamonds, hedges, bushes, groundcovers, trees, and other vegetation.

Driveway
Standards as they relate to driveways include:

- Where lot frontage at the street line is 150 feet or less, one common access/egress driveway or one pair of separate access/egress driveways is permitted.
- A single-family residence driveway shall be 12 feet wide.
- The minimum width of the common driveway surface shall be 14 feet.
- The first 20 feet of the driveway are to be constructed of pavement or concrete.

Recommendations

The Subdivision Rules and Regulations would benefit from modifications designed to promote the use of lower impact design (LID) and stormwater management techniques. In general such modifications would reduce impervious area, incorporate more LID stormwater practices and better preserve open space.

The Town's Zoning Bylaw and Subdivision Rules and Regulations already allow pervious surfaces for residential driveways and have established Flexible Residential Open Space Development (FROSD), which allows common driveways and flexible area and frontage requirements to create opne space.

Recommended Revisions to the Zoning Bylaw and Subdivision Rules and Regulations for Discussion

The table below provides more specific recommendations on how to further promote LID in the Town of Hampden for discussion and collaboration with the Town's Planning Board, Department of Public Works, and the Fire Department based on recommendations from the Massachusetts Low Impact Development Toolkit[1] and the American Planning Association (APA) guidebook, Sustainable Neighborhood Road Design: A Guidebook for Massachusetts Cities and Towns[2].

TABLE 2
Summary of Proposed Recommendations to the Subdivision Rules and Regulations for the Town of Hampden

Reference	Topic	Existing Requirement	Recommendations
Subdivision – Section 5.1.2	Street Design: Width	Minor Roads and Streets are 26 feet, Secondary Collector are 28 feet, and Primary Collector is 36 feet.	Consider minimizing residential road as much as possible. Consider low-density residential widths of 18-22 feet. Consider allowing narrow widths where there are no houses, buildings, intersections, or where on-street parking is not anticipated.
Subdivision – Section 5.1.5.	Street Design: Cul-de-Sacs	Minimum radius for a circular turnaround shall be 75 feet for the exterior line of a street and 50 feet for paving area.	Consider minimum diameter to be 70 feet, but up to 90 feet is also acceptable.
Subdivision – Section 5.1.5.	Street Design: Cul-de Sacs	No islands shall be permitted.	Consider permitting a landscaped island inside all cul-de-sacs and consider vegetated stormwater management in the island.
Subdivision – Section 6.2.6.	Street Design: Cul-de-Sacs	No current provisions for alternative layouts.	Consider alternative layouts, such as hammerheads or one-way loop streets, on short streets in low-density residential areas.

[1] https:www.mapc.org/resource-library/low-impact-development-toolkit/

[2] https://www.apa-ma.org/wp-content/uploads/2018/12/NRB_Guidebook_2011.pdf

TABLE 2
Summary of Proposed Recommendations to the Subdivision Rules and Regulations for the Town of Hampden

Reference	Topic	Existing Requirement	Recommendations
Subdivision – Section 5.5	Street Design: Stormwater Management	Catch basins, manholes, etc...	Consider alternate, open-section drainage methods. Consider establishing design criteria for swales alongside the road for stormwater treatment.
Subdivision – Section 5.8	Sidewalks: Layout	Ordinarily only one sidewalk will be required except on major collectors.	Consider allowing alternate pedestrian networks to substitute for sidewalks, with a minimum paved width of 4 feet.
Subdivision – Section 5.8	Sidewalks: Materials	No current provisions for permeable sidewalk materials.	Consider permitting use of permeable surfaces for sidewalks.
Subdivision	Driveways: Width	No minimum width for residential driveways.	Consider minimum driveway width of 9 feet for one-way and 18 feet for two-way.
Subdivision	Open Space	No current provisions for low impact stormwater management techniques near open space areas	Consider adding language such as "Low impact stormwater management techniques such as bioretention areas, rain gardens, vegetated swales, and filter strips may be located within the open space area and count towards the requirement"
Subdivision	Stormwater Management	No current provisions for rooftop runoff to vegetated areas	Consider allowing rooftop runoff to discharge to lawn areas and buffers, provided that it ultimately infiltrates.

TABLE 2
Summary of Proposed Recommendations to the Subdivision Rules and Regulations for the Town of Hampden

Reference	Topic	Existing Requirement	Recommendations
Zoning – Section 7.54.1.c	Single Family Residence Driveways: Width	A single-family residence driveway shall be 12 ft wide and must be set back 10 ft from the side and rear lot lines	Consider minimum driveway width of 9 ft. for 1-way and 18 ft for 2-way.
Zoning – Section 7.54.2.c	Common Driveways: Width	Minimum width of the common driveway surface shall be 14ft	Consider minimum driveway width of 9 ft. for 1-way and 18 ft for 2-way.
Zoning – Section 7.54.2.d	Flexible Residential Open Space Development (FROSD) Driveways: Width	Width of the FROSD Common driveway right of way shall be 32 ft	Consider width of 33-36 feet for single use, narrow residential ROW.
Zoning – Section 7.54.1.g	Driveways: Material	The first 20ft of the driveway is to be constructed of pavement/concrete. The remainder materials to be used shall be constructed and maintained to allow safe passage of emergency vehicles	Consider driveway width of 9 ft. for 1-way and 18 ft for 2-way.
Zoning – Section 7.54.3	Non-Residential Driveways: Width	Driveways must be at least 20 ft wide where separate access and egress driveways are provided and 25 ft where a common access/egress driveway is provided	Consider driveway width of 9 ft. for 1-way and 18 ft for 2-way.
Zoning – Section 6	Parking Design: Ratios	Required spaces are minimums.	Consider having parking ratios be a maximum rather than a minimum.
Zoning – Section 6	Parking Design: Stall dimensions	No current provisions for maximum stall dimensions	Consider a maximum of 9'x18'
Zoning – Section 6	Parking Design: Pervious Materials	No current provisions for pervious parking lot materials	Consider allowing pervious materials for stalls and spillover areas. Consider adding language such as: "Pervious materials such as porous pavers, paving stones, reinforced grass, and pervious pavement may be allowed in lower volume stalls or overflow parking areas."
Zoning – Section 7.7.2.f	Parking Lot Design: Landscaping	No less than 15% of the area of a parking lot, not including the perimeter area, shall be permanently landscaped.	Consider allowing or requiring stormwater practices in islands, landscaped areas and setbacks. Consider adding

TABLE 2
Summary of Proposed Recommendations to the Subdivision Rules and Regulations for the Town of Hampden

Reference	Topic	Existing Requirement	Recommendations
			language such to this section as: "Low impact stormwater management techniques such as bioretention areas, rain gardens, vegetated swales, and filter strips may be located within the landscaped areas and count towards the requirement."
Zoning	Lot Layout: Lawn Requirements	No current provisions for lawn extent limits	Consider establishing limits of extent of lawn area on residential lots, either by area or by percentage of lots.
Zoning	Lot Layout: Impervious Area Limits	No current provisions for impervious limits in low-density areas	In low-density areas, consider establishing limits on impervious lot coverage (e.q. 15 %). (Not appropriate for town centers or moderate density neighborhoods where compact development should be encouraged).
Zoning	Conservation: Incentives	No current provisions of conservation incentives	Consider implementing incentives to developers or landowners to conserve non-regulated land (i.e. density bonuses, stormwater credits, lower property tax rates)

TABLE 3
Comparison of Current Requirements for Local Streets with Recommendations for Residential Road Design Parameters from Sustainable Neighborhood Road Design: A Guidebook for Massachusetts Cities and Towns

Parameter	Current Requirement for Local Streets	Recommendations for Residential Road Design Paramters Relative to Roadside Width		
		Single Use Residential - Wide	Signle Use Residnetial - Medium	Single Use Residential - Narrow
Traveled Way				
Typical ADT	N/A	4,999 < 1,500	1,499 < 400	399 < 0
Design Speed	N/A	25-30 mph	20 mph	20 mph
Number of Through Lanes	2	2	2	2
Lane Width	N/A	10-12 feet	10-12 feet	10 feet
Shoulder	5 feet	2 feet	2 feet	2 feet
Bike Lanes	N/A	Shared road or 6 feet wide	Shared road	Shared road
Utility Easement Width	20 feet	---	---	10 feet

Range of ROW Width	40 – 60 feet	40-50 feet	36-40 feet	33-36 feet
Roadside				
Desirable Roadside Width (Pedestrian, Swale, and Planting Strip)	N/A	5.5-12 feet	5.5-10 feet	5.5 feet
Grass Plot / Planting Strip	2 feet	0-6 feet	0-6 feet	0-6 feet
Minimum Sidewalk Width	4 feet	4 feet one side ok	4 feet / shared road	Shared road

Next Steps

The proposed recommendations for revision presented in Table 2 should be discussed and refined through a joint working meeting of relevant boards and commissions including the Town's Planning Board, Highway Department, and Fire Department. Per the 2016 Small MS4 General Permit, recommended changes must have a corresponding proposed schedule to incorporate policies and standards into relevant documents and procedures to minimize impervious cover attributable to parking areas and street designs. The joint meeting should also include development of a schedule of implementation of proposed revisions and recommended actions.

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Preliminary Retrofit Inventory Memorandum

June 2021

Preliminary Analysis of Municipal Properties for Retrofit Inventory, Town of Hampden, Massachusetts

TO: Hampden Stormwater Management Program Files

FROM: Tracy Adamski, AICP, Emily Tully, and Kristin Dippold, Tighe & Bond

COPY: Donald Davenport, Chair, Town of Hampden Board of Selectmen

DATE: June 2021

Background

Per Section 2.3.6.d of the 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 (referred to herein as "2016 Small MS4 General Permit"), within four years from the effective date of the permit, permittees are required to identify a minimum of five permittee-owned properties that could be potentially modified or retrofitted with best management practices (BMPs) designed to reduce the frequency, volume, and pollutant loads of stormwater discharges to and from its MS4 through the reduction of impervious area.

Hampden has fifteen Town-owned or controlled properties within the designated MS4 area, only two of which have existing impervious area. Parcel 17_47_0 is the Hampden Senior Center located on Allen Street and has 1.16 acres of existing impervious area. Parcel 17_48_0 is the Thornton Burgess Middle School located on Wilbraham Road with 5.59 acres of existing impervious area.



Figure 1. Hampden Senior Center on Allen Street (left) and the Thornton Burgess Middle School on Wilbraham Road (right).

According to communication from EPA Region 1, a retrofit inventory can also focus on any areas the town has control over (like roads or rights-of-way). In addition to the two town-owned parcels with impervious area, roadway improvement projects within the designated MS4 area were analyzed for potential for stormwater BMP retrofits.

The following memorandum summarizes a preliminary desktop screening and ranking of two municipal properties and roadways with potential for stormwater BMP retrofits based on retrofit criteria described in the 2016 Small MS4 General Permit, amount of existing impervious cover, physical site characteristics, and planned capital improvements projects,

and provides a summary of retrofit types and considerations, including compliance with the nitrogen-removal requirements associated with the Long Island Sound Total Maximum Daily Load (TMDL).

Desktop Screening and Preliminary Ranking of Town-Owned Sites with Potential for Stormwater BMP Retrofits

Tighe & Bond has performed a desktop analysis using the Town's GIS data to assess municipal properties for potential modification or retrofits with BMPs based on criteria outlined in Section 2.3.6.d of the 2016 Small MS4 General Permit. In accordance with Section 2.3.6.d of the 2016 Small MS4 General Permit, Tighe & Bond considered properties with significant impervious cover (including parking lots, buildings, and maintenance yards) within the urbanized area that could be modified or retrofitted with a stormwater BMP to reduce stormwater quantity and/or improve quality. MS4 infrastructure that could be readily modified or retrofitted (such as outfalls and conventional stormwater conveyances including swales and detention practices) were also considered. Conservation land and land without impervious areas were removed from consideration.

Tighe & Bond further included consideration of schedules for planned capital improvements to storm 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, and/or drinking water supply sources.

To analyze the favorability of implementing BMP designs throughout the Town of Hampden, Tighe & Bond used the following process:

Step 1: A GIS-based, desktop screening and preliminary ranking to identify and prioritize potential locations for BMP retrofits

Step 2: Comprehensive review of results of desktop screening and preliminary ranking, including review of information collected during site visits to further evaluate feasibility, collect information, and identify other site conditions that would impact implementation

Step 3: Finalize a preliminary list of municipally owned sites for future retrofit feasibility analysis

The full Desktop Screening Table is included as Attachment 1 and a figure showing the locations of the top 2 municipally owned sites to consider for stormwater BMP retrofits is provided as Attachment 2.

Preliminary Retrofit Inventory Results

Based on the results of the desktop analysis, discussions with the Town, and the requirements of the 2016 Small MS4 General Permit, Tighe & Bond has developed a list of Town-owned properties and roadways to prioritize for future retrofit feasibility analysis, provided in Table 1 below.

Table 1

Municipally Owned Sites for Future Retrofit Feasibility Analysis

Town-Owned Properties		
Name	**Parcel ID Number**	**Address**
Hampden Senior Center/COA	17_47_0	104 Allen Street
Thornton Burgess Middle School	17_48_0	85 Wilbraham Road

Roadways		
Name	**Location**	**Reason to Prioritize**
Mill Road	East of intersection of Somers Road	Proximity to Scantic River
Main Street	Corner of Main and Somers Road	Proximity to Scantic River
East Longmeadow Road	East of intersection of Somers Road	Proximity to Scantic River

Potential Stormwater BMP Retrofit Options

The following section describes potential stormwater BMP retrofit options. Site-specific considerations such as scale of the project, performance goals, planned physical capital projects, and financing opportunities will need to be taken into account to select specific stormwater retrofits or modifications for each property. Additionally, as the Town of Hampden is located within the Connecticut River subwatershed of the Long Island Sound, the Town is subject to the requirements of Appendix H, which require retrofits to be designed to enhance nitrogen removal.

Retrofits can be classified by the amount of subwatershed area they treat. Storage retrofits treat drainage areas ranging from five to 500 acres. By contrast, on-site, nonresidential retrofits normally treat less than five acres of contributing drainage area, and frequently less than one.[1] Preferred practices per the EPA fact sheet on stormwater retrofits[2] include those that provide for increased infiltration, evapotranspiration, and rainwater harvesting, such as infiltration basins and trenches, bioretention systems, rain gardens, and swales, as well as retrofitting existing BMPs like dry detention basins to maximize pollutant removal.

Storage and on-site retrofits represent two different approaches to attain treatment storage and involve different design and assessment methods (Table 2). Generally, storage retrofits are a more cost-effective approach to meet most subwatershed objectives, although both retrofit approaches may be needed to get the desired level of subwatershed treatment.

TABLE 2
Two Different Approaches to Retrofitting

Storage Retrofits	**On-Site Retrofits**
Serve 5 to 500 acres	Serve 0.1 to 5 acres
Moderate cost per impervious acre treated	High cost per impervious acre treated
Impractical in ultra-urban areas	Practical in ultra-urban areas
Permitting can be extensive	Few permits are needed
Can address all stormwater control targets	Only provide recharge and water quality control
Use extended detention, wet pond, and wetlands	Rely on bioretention, filtering, infiltration, swales and other treatment practices

Storage Retrofit Classification. Potential ways to add storage retrofits based on location are described in detail in Table 3. Most storage retrofits rely on some combination of extended detention, wet pond, constructed wetland or bioretention for stormwater treatment.

[1] Virginia Stormwater Management Handbook, Chapter 7 July 2013 7-19

[2] U.S. EPA, Stormwater Retrofit Techniques for Restoring Urban Drainages in Massachusetts and New Hampshire, Small MS4 Permit Technical Support Document, April 2011

TABLE 3
The Six Most Common Storage Retrofit Locations in a Subwatershed

Where to Look	How to Get Storage
Add Storage to Existing Basins	Add water quality treatment storage to an existing basin that lacks it by excavating new storage on the pond bottom, raising the height of the embankment, modifying riser elevations/dimensions, converting unneeded quantity control storage into water quality treatment storage and/or installing internal design features to improve performance
Storage Above Roadway Culverts	Provide water quality storage immediately upstream of an existing road culvert that crosses a low gradient, non-jurisdictional channel. Additional storage is created by adding wetland and/or extended detention treatment behind a new embankment just upstream of the existing roadway embankment.
New Storage Below Outfalls	Flows are split from an existing storm drain or ditch and are diverted to a stormwater treatment area on public land in the stream corridor. Works best for storm drain outfalls in the 12- to 36- inch diameter range that are located near large open spaces, such as parks, golf courses and floodplains.
Storage in Conveyance Systems	Investigate the upper portions of the existing stormwater conveyance system to look for opportunities to improve the performance of existing swales, ditches and non-jurisdictional channels. This can be done either by creating in-line storage cells that filter runoff through swales and constructed wetlands or by splitting flows to off-line treatment areas in the drainage corridor.
Storage in Road Rights-of-Way	Direct runoff to a depression or excavated stormwater treatment area within the right of way of a road, highway, transport or power line corridor. Prominent examples include highway cloverleaf, median and wide right of way areas.
Storage Near Large Parking Lots	Provide stormwater treatment in open spaces near the down-gradient outfall of large parking lots (5 acres plus).

On-Site Retrofit Classification. On-site retrofits are classified based on the type or location of impervious area they treat, such as individual rooftops, small parking lots, streets, stormwater hotspots and other small impervious areas. Several common potential on-site retrofit locations are described in Table 4. On-site retrofits treat the quality and/or reduce the volume of runoff generated by small urban source areas and rely on bioretention, filtering, infiltration, swales or rooftop treatment. On-site retrofits are an effective strategy in urban subwatersheds that lack space for storage retrofits, and can also provide excellent opportunities to improve public awareness and involvement.

TABLE 4
Common On-Site Retrofit Locations

Where	How
	Retrofits Appropriate for Roadways
Individual Streets	Look for opportunities with the street, its right of way, cul-de-sacs and traffic calming devices to treat stormwater runoff before it gets into the street storm drain network.
Little Retrofits	Convert or disconnect isolated areas of impervious cover and treat runoff in an adjacent pervious area using low tech approaches such as a filter strip.
	Other Retrofits for Consideration
Small Parking Lots	Insert stormwater treatment within or on the margins of small parking lots (less than five acres). In many cases, the parking lot is delineated into a series of smaller on-site treatment units.
Individual Rooftops	Disconnect, store, and treat stormwater runoff generated from residential and commercial rooftops close to the source.
Hardscapes Landscapes	Reconfigure the plumbing of high visibility urban landscapes, plazas and public spaces to treat stormwater runoff with landscaping and other urban design features.
Underground	Provide stormwater treatment in an underground location where no surface land is available for surface treatment. Use this as a last resort at densely developed sites.

Nitrogen Removal BMPs. As the Town is located within the Connecticut River watershed and Long Island Sound drainage basin, the Town is subject to the requirements of the Long Island Sound Total Maximum Daily Load (TMDL) for Nitrogen as described in Appendix F, part B.I. of the 2016 Small MS4 General Permit. Per Appendix F, part B.I.1.c., the retrofit inventory shall include consideration of structural BMP installation for nitrogen removal. Attachment 1 to Appendix H describes the method to calculate BMP nitrogen load and nitrogen load reductions for structural BMPs, and also provides a table that classifies structural BMPs in terms of nitrogen reduction and a chart showing total estimated nitrogen removal for those practices, as provided below.

TABLE 5
Approaches to Retrofitting

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)

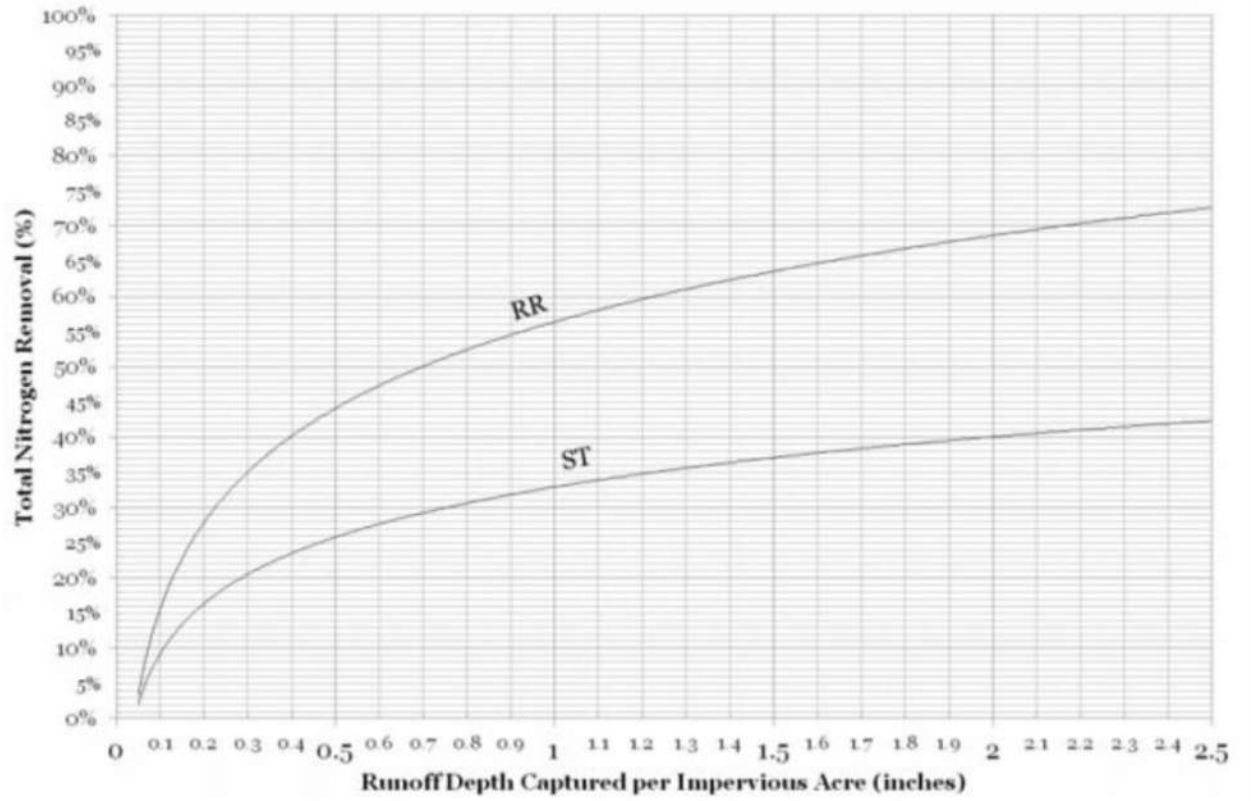


FIGURE 2. Total Nitrogen Removal for RR and ST Practices (from Attachment 1 to Appendix H)

The town is required to install a minimum of one structural BMP targeting a catchment with high nitrogen load potential as a demonstration project within six years of the permit effective date.

Next Steps

Tighe & Bond has completed retrofit scoping and the desktop retrofit analysis and narrowed the potential retrofit locations to two municipally-owned sites and roadways. The next steps in the retrofit process involve evaluation and ranking of retrofit BMP design concepts based on ability to disconnect impervious cover on-site, pollutant reduction requirements including targeting catchments with high nitrogen load potential, feasibility and performance, cost including long-term operations and maintenance, opportunities for public use and education, and community support.

More detailed site information will need to be collected to design and site the retrofit BMPs, including site-specific soil and water table conditions and current and future site uses and associated potential pollutant loading. The results of the Nitrogen Source Identification Report to be completed within four years of the permit effective date will inform the identification of potential catchments with high nitrogen loading.

Tighe&Bond
Engineers | Environmental Specialists

ATTACHMENT 1

Parcel_ID	Parcel_Address	Name	Existing Impervious Area (Acres)	Subsurface Geology	Wetlands (Acres)	Proximity to Aquifers (distance in miles)	Proximity to WQ Impaired Water (distance in miles)	Opportunities for Public Use and Education	Discharge to WQ Impaired Water	Drinking Water Supply Source
6_4_0	MILL RD		0	Alluvium Floodplain, Coarse Glacial Stratified Deposits, Thin Till, Stream Terrace Deposits	0.31	Within Medium Yield Aquifer	Scantic River Directly Abuts		Yes	
6_28_9	GRIST MILL LN		0	Coarse Glacial Stratified Depsoits, Thin Till	0.37	Within Medium Yield Aquifer	Scantic River 0.08 Miles		Yes	
7_95_0	BAYBERRY RD		0	Swamp Deposits, Coarse Glacial Stratified Depsoits, Thin Till	1.33	Within Medium Yield Aquifer	Scantic River 0.16 Miles		Yes	
7_116_0	MILL RD		0	Swamp Deposits, Coarse Glacial Stratified Depsoits, Thin Till	2.9	Within Medium Yield Aquifer	Scantic River 0.09 Miles		Yes	
7_117_0	MILL RD		0	Swamp Deposits, Coarse Glacial Stratified Depsoits, Thin Till	0.17	Within Medium Yield Aquifer	Scantic River 0.11 Miles		Yes	
7_154_0	MILL RD	Conservation Land	0	Artificial Till, Swamp Deposits, Alluvium Floodplain, Coarse Glacial Stratified Deposits, Thin Till	7.99	Within Medium Yield Aquifer	Scantic River Segments the Parcel		Yes	
7_57A_1	ERICA CR		0	Thin Till	0	0.03 Miles from Medium Yield Aquifer	Scantic River 0.22 Miles		Yes	
17_47_0	104 ALLEN ST	Hampden Senior Center/COA	1.16	Alluvium Floodplain, Coarse Glacial Stratified Deposits, Thin Till	3.83	Within Medium Yield Aquifer	Scantic River 0.54 Miles	Yes	Yes	Within Public Water Supply
17_48_0	85 WILBRAHAM RD	Thornton Burgess Middle School	5.59	Alluvium Floodplain, Coarse Glacial Stratified Deposits, Thin Till, Swamp Deposits	3.18	Within Medium Yield Aquifer	Scantic River 0.56 Miles	Yes	Yes	Within Public Water Supply
21_105_0	BALDWIN DR		0	Swamp Deposits, Coarse Glacial Stratified Depsoits, Thin Till	0.54	Within Medium Yield Aquifer	Scantic River 1.86 Miles			
21_107_0	BALDWIN DR		0	Swamp Deposits, Coarse Glacial Stratified Depsoits, Thin Till	1.2	Within Medium Yield Aquifer	Scantic River 1.83 Miles			
21_131_0	100 SESSIONS/CRESTWOOD		0	Swamp Deposits, Coarse Glacial Stratified Depsoits, Thin Till	4.73	Within Medium Yield Aquifer	Scantic River 1.58 Miles			
21_132_0	SESSIONS DR		0	Swamp Deposits, Coarse Glacial Stratified Depsoits, Thin Till	0.4	Within Medium Yield Aquifer	Scantic River 1.73 Miles			
22_173_0	ROSE CR		0.01	Alluvium Floodplain, Coarse Glacial Stratified Deposits, Thin Till, Swamp Deposits	0	Within Medium Yield Aquifer	Scantic River 1.79 Miles			
22_176_0	SESSIONS DR		0	Alluvium Floodplain, Swamp Deposits, Coarse Glacial Stratified Deposits, Thin Till, Artificial Fill	0.84	Within Medium Yield Aquifer	Scantic River 1.69 Miles			

Legend

- Conservation Properties
- No Existing Impervious Area
- Top Sites
- N/A

Tighe&Bond
Engineers | Environmental Specialists

ATTACHMENT 2

ATTACHMENT 2
RETROFIT INVENTORY

WILBRAHAM
SPRINGFIELD

SPRINGFIELD
EAST LONGMEADOW

BURLIEGH ROAD
HOLLOW ROAD
GLENDALE ROAD
AMES ROAD
RIDGE ROAD
NORTH MONSON ROAD
NORTH ROAD
MOUNTAIN ROAD
BENNETT ROAD
KELLY LANE
ANDREWS CIRCLE
WOODLAND DRIVE
SESSIONS DRIVE
BROOKSIDE DRIVE
ECHO VALLEY DRIVE
PONDVIEW DRIVE
ALLEN CREST DRIVE
STONY HILL ROAD
GREENLEAF DRIVE
FERNWOOD DRIVE
RAYMOND DRIVE
ALLEN PLACE
PINEWOOD ROAD
Hampden Senior Center
ALLEN STREET
WILBRAHAM ROAD
Thornton Burgess Middle School
Scantic River
CROSS ROAD
HIGHLAND CIRCLE
SOUTH MONSON ROAD
MAIN STREET
STEEPLEVIEW DRIVE
EAST LONGMEADOW ROAD
MOHAWK DRIVE
CARMODY ROAD
MEADOWBROOK LANE
WALNUT ROAD
FOX RUN LANE
GENEVIEVE DRIVE
COLONY DRIVE
MILL ROAD
SOMERS ROAD
SOUTH ROAD
CHAPIN ROAD
SCANTIC ROAD
THRESHER ROAD
ROCKADUNDEE ROAD
STAFFORD ROAD
SAINT GERMAIN ROAD
MARTIN FARMS ROAD
SOUTH RIDGE ROAD
HOWLETT HILL ROAD
PARADISE LANE

CONNECTICUT

Legend

- Municipally Owned Parcels in UA
- Municipally Owned Parcels outside of UA
- Hampden Parcels
- Town Boundary
- MS4 Regulated Area (2010 Census)
- MS4 Regulated Area (2000 Census)
- Streams

Water Body AUS - River (arcs)

Category

- *2) Attaining some uses; other uses not assessed*
- 3 - No uses assessed
- 4A - Impaired - TMDL is completed
- 4C - Impairment not caused by a pollutant
- 5 - Impaired - TMDL required

Water Body AUs - Lakes, Estuaries (polygons)

Category

- 2 - Attaining some uses; other uses not assessed
- 3 - No uses assessed
- 4A - Impaired - TMDL is completed
- 4C - Impairment not caused by a pollutant
- 5 - Impaired - TMDL required

LOCUS MAP



N

0 1,000 2,000
Feet
1:32,937

NOTES

1. Based on MassGIS Color Orthophotography (2013)
2. Based onEast Longmeadow Standardized Assessors' Parcels (2019)

Retrofit Inventory
Hampden, MA

June 2021

Tighe&Bond
Engineers | Environmental Specialists

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H-1436

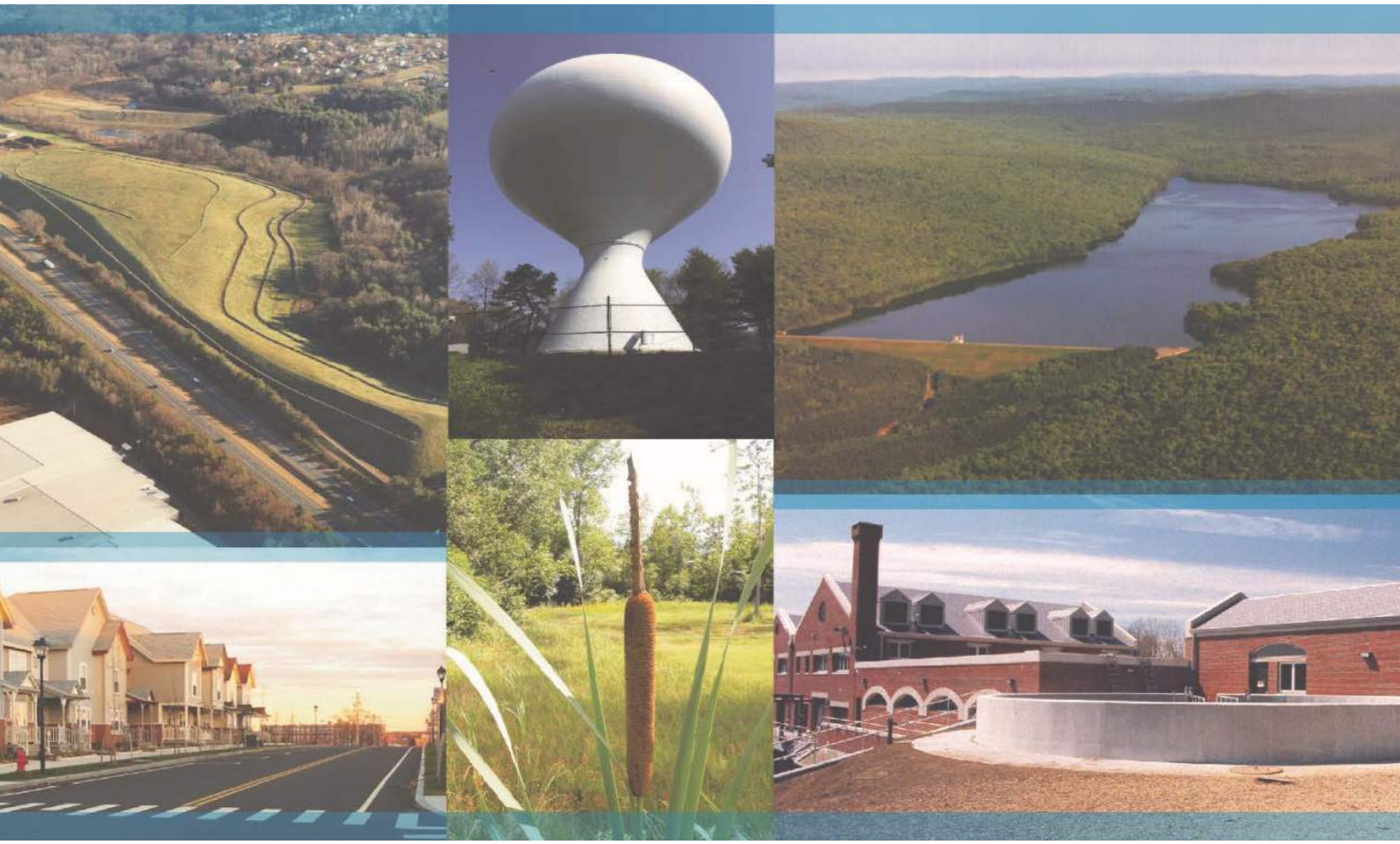
Tighe&Bond

APPENDIX G

Amend. No.	Description of the Amendment	Date of Amendment	Amendment Prepared by (Name / Signature)
1	Added impairments and updated receiving waters table, Phase 1 stormwater system map, Catchment Investigation Procedures, Dry Weather Sampling Memo and Results, SWPPPs, and Good Housekeeping O&M Plan to Appendix F: Record Keeping	6/30/2020	Emily Tully, Tighe & Bond 
2	Added revised Stormwater Management Bylaw as approved at Town Meeting on May 10, 2021, updated priority list of outfalls and catchments, key junction manhole mapbooks, Green Infrastructure Regulatory Review Memo, Impervious Cover Assessment Memo, and Retrofit Inventory to Appendix F: Record Keeping	6/30/2021	Emily Tully, Tighe & Bond 
3			
4			
5			
6			
7			
8			
9			

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APPENDIX H



Town of Hampden, Massachusetts

Illicit Discharge Detection and Elimination Program

NPDES Permit #MA0410009

June 2019

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Appendix F Written Procedures and Forms
Appendix G Impaired Waters and TMDLs
Appendix H Tracking Implementation Goals and Milestones
Appendix I IDDE Training Program

Commonly Used Abbreviations	Definitions
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
GIS	Geographic Information System
GPS	Global Positioning System
IDDE	Illicit Discharge Detection and Elimination
MassDEP	Massachusetts Department of Environmental Protection
MCM	Minimum Control Measure
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
SOP	Standard Operating Procedure
SSO	Sanitary Sewer Overflow
SWMP	Stormwater Management Program
TMDL	Total Maximum Daily Load

Section 1
Introduction

1.1 Background

The U.S. Environmental Protection Agency (EPA) nationally regulates the discharge of stormwater runoff that is transported into local water bodies through Municipal Separate Storm Sewer Systems (MS4) that are located in Urbanized Areas (also known as "Regulated Areas"). The Town of Hampden meets EPA's regulatory threshold, and therefore is required to obtain coverage under a National Pollutant Discharge Elimination System (NPDES) permit for its stormwater discharges from the MS4 in its Urbanized Area.

In Massachusetts, EPA Region 1 and the Massachusetts Department of Environmental Protection (MassDEP) jointly administer the municipal stormwater program, and authorize Hampden to discharge stormwater under the *EPA NPDES General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts*, known as the "Small MS4 General Permit." The permit was first issued in 2003 and an updated permit was issued in 2016. Under this program, the Town has developed and implemented a Stormwater Management Program (SWMP) to reduce the contamination of stormwater runoff and prohibit illicit discharges.

The Small MS4 Program contains six elements called *minimum control measures* (MCMs) that, when implemented, should result in a significant reduction in pollutants discharged into receiving waters. The MCMs are:

1. Public Education and Outreach
2. Public Involvement and Participation
3. Illicit Discharge Detection and Elimination (IDDE)
4. Construction Site Stormwater Runoff Control
5. Post-Construction Stormwater Management
6. Good Housekeeping and Pollution Prevention

Once implemented, the IDDE Program described herein will satisfy the requirements under the third MCM and is one part of Hampden's overall SWMP for compliance under the Small MS4 General Permit.

1.2 Plan Applicability

This IDDE Plan should be implemented throughout the MS4 in Hampden's Regulated Area. Regulated Areas are defined by the latest Urbanized Area delineated in the United States (U.S.) decennial census. Figure 1.1 below shows EPA's map of Hampden's Regulated Area (in red hatching) based on the 2000 and 2010 census listings[1]. The Town of Hampden's Regulated Area is primarily in the portion of Town west of Wilbraham Road and Somers Road. The remaining area of Town east of Wilbraham Road/Somers Road is not considered to be part of the MS4 regulated area.

[1] https://www3.epa.gov/region1/npdes/stormwater/ma/ram/hampden.pdf

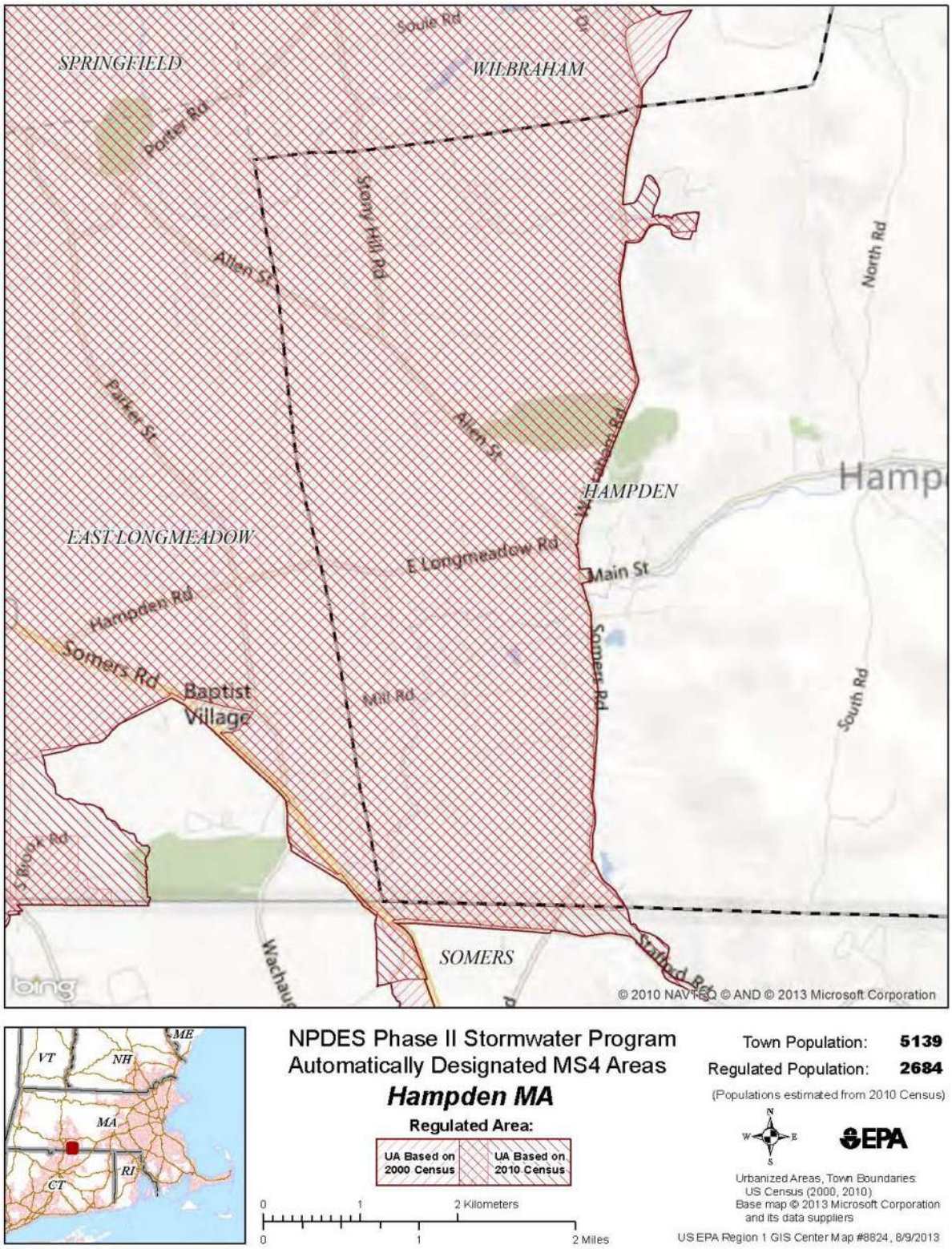


Figure 1.1. The Town of Hampden's Urbanized/Regulated Area under the NPDES MS4 program based on the 2000 and 2010 U.S. Censuses.

1.3 Definition of an Illicit Discharge

An "illicit discharge" is defined by EPA's NPDES regulations at 40 CFR 122.26(b)(2) as **any discharge to a MS4 that is not composed entirely of stormwater**. Exceptions include allowable discharges pursuant to a NPDES permit, and discharges that are not anticipated to introduce pollutants into the storm drain system. Under the 2016 Small MS4 General Permit and the Hampden Stormwater Management Bylaw (General Bylaws Chapter XIV), the following discharges are allowed:

- Discharge or flow from firefighting activities
- Waterline flushing
- Flow from potable water sources
- Springs
- Natural flow from riparian habitats and wetlands
- Diverted stream flow
- Rising groundwater
- Uncontaminated groundwater infiltration as defined in 40 CFR 35.2005(20), or uncontaminated pumped groundwater
- Water from exterior foundation drains, footing drains (not including active groundwater dewatering systems), crawl space pumps
- Air conditioning condensation
- Discharge from landscape irrigation or lawn watering
- Water from individual residential car washing
- Discharge from dechlorinated swimming pool water, provided the water is allowed to stand for one week prior to draining and the pool is drained in such a way as to not cause a nuisance
- Street wash water and residential building wash waters, without detergents
- Discharges or flows from firefighting activities
- Dye testing, provided verbal and written notification is given to the Board of Selectmen prior to the time of the test
- Non-stormwater discharges permitted under an NPDES permit, waiver, or waste discharge order administered under the authority of the EPA, provided that the discharger is in full compliance with the requirements of the permit, waiver, or order and applicable laws and regulations
- Discharge for which advanced written approval is received from the Board of Selectmen as necessary to protect public health, safety, welfare, and the environment.



Sump pump discharges may discharge to the MS4 provided the flow is "uncontaminated pumped groundwater."

A copy of the Town's *Stormwater Management Bylaw*, Chapter XIV of the Town of Hampden General Bylaws, is provided in **Appendix A**.

Illicit discharges can enter the drainage system through direct connections or indirect sources. A direct connection is any non-stormwater pipe connected to the storm drain system, such as pipe from a washing machine or floor drain or a sewer line from a house.

An indirect discharge may come from a wide variety of sources, such as sanitary sewer overflows (SSOs), infiltration into the drainage system from failed septic systems, or hazardous waste spills collected by storm drains. Grass clippings, leaf litter, and other solid material dumped or otherwise deposited in the storm drain system are also considered illicit discharges.



Direct discharge from a pipe (from IDDE Guidance Manual, Center for Watershed Protection, 2004).

1.4 Illicit Discharges and Water Quality

Illicit discharges contribute elevated levels of pollutants to surface water bodies and can potentially enter groundwater. These pollutants can include:

- Heavy metals
- Toxic substances
- Oil and grease
- Solvents
- Nutrients such as nitrogen and phosphorus
- Pesticides and fertilizers from lawns
- Sediment from construction sites
- Viruses and bacteria

When these pollutants enter water bodies, they can contaminate drinking water supplies, hinder recreation activities, and harm aquatic and other wildlife habitats.

1.5 Summary of EPA Requirements

As part of the 2003 Small MS4 General Permit, the Town of Hampden was required to develop, implement, and enforce a program to detect and eliminate illicit discharges. As required by Part II.B.3 of the 2003 Small MS4 General Permit, this illicit discharge program must contain the following elements:

1. If not already existing, the Town must develop a **storm sewer system map**. At a minimum, the map must show the location of all outfalls and the names of all waters that receive discharges from those outfalls. Additional elements may be included on the map, such as, location of catch basins, location of manholes, and location of pipes within the system. Initial mapping should be based on all existing information available to the Town including project plans, city records and drainage maps. Field surveys may be necessary to verify existing records and locate all outfalls.

2. To the extent allowable under state law, the Town must effectively prohibit, through a **regulatory mechanism** (such as a local bylaw or ordinance), non-stormwater discharges into the system and implement appropriate enforcement procedures and actions. If a regulatory mechanism does not exist, development and adoption of such a mechanism must be included as part of the SWMP.
3. The Town must develop and implement a plan to **detect and address non-stormwater discharges**, including illegal dumping, into the system. The illicit discharge plan must contain the following elements:
    a. Procedures to identify priority areas. This includes areas suspected of having illicit discharges, for example: older areas of the city, areas of high public complaints and areas of high recreational value or high environmental value such as beaches and drinking water sources.
    b. Procedures for locating illicit discharges (visual screening of outfalls for dry weather discharges, dye or smoke testing).
    c. Procedures for locating the source of the discharge and procedures for the removal of the source.
    d. Procedures for documenting actions and evaluating impacts on the storm sewer system subsequent to the removal.
4. The Town must **inform users of the system and the general public** of hazards associated with illegal discharges and improper waste disposal. The Town must train field inspectors to recognize illicit discharges.
5. The **non-stormwater discharges** listed in Section 1.3 of this IDDE Plan must be addressed if they are identified as being significant contributors of pollutants.

The 2003 Small MS4 General Permit expired in April 2008, but it was administratively continued and remained in force and in effect until July 1, 2018. On April 13, 2016, the U.S. EPA published the final *NPDES General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts*. The 2016 Small MS4 General Permit substantially increases stormwater management requirements relative to the 2003 Small MS4 General Permit, and mandates specific timelines for compliance.

The new IDDE requirements in the 2016 Small MS4 General Permit include the following elements that build on the 2003 Small MS4 General Permit IDDE requirements, as fully described in the 2016 Small MS4 General Permit Section 2.3.4. The elements listed below build on the 2003 IDDE requirements:

1. The Town must develop an **inventory of known locations of SSOs** that occurred within the previous five years within 120 days of the effective date of the General Permit, and document and summarize SSOs in the Annual Report. Hampden does not currently have a municipal sewer system, and this requirement is therefore currently not applicable.
2. An **inventory of all MS4 outfalls and interconnections** must be developed within one year of the effective date of the General Permit.
3. The existing **stormwater map** must be built upon by including all outfalls, interconnections with other MS4s, catch basins, manholes, pipes, flow direction, catchment delineations, and public and private BMPs. This additional mapping must be complete within two years of the effective date of the permit.

Additional items must be added for all outfalls within ten years of the effective date of the permit: latitude and longitude for all outfalls, pipes, manholes, catch basins, refined catchment delineations, and municipal sanitary/combined sewer system (if applicable at that time).

4. A **written IDDE Plan** must be developed within one year of the effective date of the permit. This document was prepared to meet this requirement.
5. The Town must **sample during dry weather**[2] **at all outfalls where flow is present**, and test the flow for signs of illicit discharges within three years of the permit effective date.
6. Based on the results of sampling and characteristics of the catchment areas, the Town must **rank all MS4 catchments for potential of illicit discharges** into the following categories: "Problem", "High Priority", "Low Priority", and "Excluded".
7. A **catchment investigation procedure** that includes a systematic investigation of prioritized catchments, screening of key junction manholes, and wet weather outfall screening in catchments with system vulnerability factors must be developed and implemented.
8. An **annual training** must be provided for all employees involved in the IDDE Program on how to recognize illicit discharges (and, if applicable, SSOs).
9. **Program progress and effectiveness** must be evaluated and reported on yearly in the Annual Report.

Appendix B includes applicable excerpts from the 2016 Small MS4 General Permit.

1.6 Purpose of the IDDE Program

The IDDE Program described herein establishes a proactive, written program to address illicit discharges to the MS4. The IDDE Program includes activities for compliance with the 2016 Small MS4 General Permit, under which the Town of Hampden is currently authorized to discharge stormwater[3].

[2] Per section 2.3.4.7 b.ii of the 2016 Small MS4 General Permit, 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.

[3] The authorization to discharge for NPDES Permit ID #MAR041009, Town of Hampden, was issued on April 5, 2019, https://www3.epa.gov/region1/npdes/stormwater/ma/tms4noi/hampden-auth.pdf

Section 2
Sanitary Sewer and Septic Systems

Sanitary sewage can be linked to significant indirect illicit discharges in the form of sewage infiltration to the storm drain. According to section 2.3.4.4.c of the 2016 Small MS4 General Permit, the Town must provide oral notice of an SSO to EPA within 24 hours upon becoming aware of the SSO occurrence. Additionally, the Town must provide written notice to EPA and MassDEP within five days of becoming aware of the SSO occurrence. The MassDEP SSO Reporting form is included in **Appendix C**.

As the Town of Hampden does not have a sanitary sewer system at the time of the development of this written IDDE Program, information on SSOs and sanitary system management is provided for reference only.

2.1 Sanitary System Management

Hampden currently does not have a public or private sewer system. Wastewater in the Town is disposed of via on-site wastewater disposal (septic) systems. The Town therefore does not have interconnected storm and sanitary sewer infrastructure, and has not experienced any overflows due to storm events. In the event that the Town obtains sewer service in the future, the Town will track any future SSOs and keep a record in **Appendix C** and the Town's written SWMP.

2.2 Septic System Management

Incorrectly managed or malfunctioning septic systems have the potential to discharge improperly treated or excess quantities of wastewater to the MS4, either due to infiltration via groundwater or through septic system breakouts over land, resulting in a discharge of sanitary sewage from the MS4 to receiving waters. Typical pollutants found in septic systems are nutrients, pathogens, dissolved metals, detergents, and solvents. To mitigate this potential pollution source, the Town Board of Health implements and enforces Title 5 of the State Environmental Code, the State Sanitary Code (Septic System Regulations).

The Town of Hampden is served by septic systems. Like most New England communities, in Hampden there are areas of high groundwater, areas with poor soils, and known septic system challenges. Neighborhoods that have dense populations, steep hills, and poor soil conditions are prone to septic system failures.

To date, no major water quality problems due to septic system failures have been identified[4]; however, there are areas of Town known to have historically high groundwater and associated septic system functionality concerns. Similarly, areas of Town within the floodplain of the Scantic River are known to historically have had septic system operational problems due to flooding.

[4] http://www.pvpc.org/file/hampden-osrp-update-2017-final-070318r1pdf

When the Town's catchment areas were ranked to prioritize illicit discharge investigations, areas in the Urbanized Area with historic septic system problems and areas where conditions are less favorable for onsite wastewater disposal that may have high illicit discharge potential were considered.

2.3 Action Plan

Action Items: Sanitary Sewer Overflows	
1. Track and maintain an SSO inventory	**Not applicable at this time.** If the Town of Hampden installs a public sewer system, this action item will be implemented. The Town will add an SSO inventory to the SWMP, summarize SSO events in Annual Reports, and update the inventory annually, provide oral notice to EPA within 24 hours of identifying an SSO, and provide written notice to EPA and MassDEP within 5 days.
2. Coordinate with Board of Health	Educate the Board of Health on MS4 program requirements to identify, repair, and track illicit discharges, specifically a failing leachfield that may be discharging to the MS4 or local waters. Continue to support Board of Health programs to promote proper maintenance of septic systems.

Section 3
Stormwater System Mapping

Storm drain system mapping is an essential tool in identifying illicit discharges. Minimum mapping elements required by the 2016 Small MS4 General Permit within the Regulated Area are broken into two phases:

Phase I (required within two years of the effective date of the permit):

- Outfalls and receiving waters (required by 2003 Small MS4 General Permit)
- Open channel conveyances (swales, ditches, etc.)
- Interconnections with other MS4s and other storm drain 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. A catchment is the area that drains to an individual outfall or interconnection

Phase II (required within ten years of the effective date of the permit):

- Outfall spatial location (latitude and longitude, minimum accuracy of ± 30 feet)
- Pipes
- Catch basins
- Manholes
- Refined catchment delineations
- Municipal sanitary sewer system (not applicable)
- Municipal combined sewer system (not applicable)

The following mapping elements are not required, but are **recommended**:

- Storm sewer material, size and age
- Sanitary sewer system material, size, and age
- Privately owned stormwater treatment structures
- Properties known or suspected to be served by a septic system, especially in high-density urban areas
- Area where the Town's MS4 has been or could be influenced by septic system discharges (e.g., areas with poor soils, or high ground water elevations unsuitable for conventional subsurface disposal systems)
- Seasonal high groundwater table elevations impacting sanitary alignments
- Topography
- Orthophotography

- Alignments, dates and representation of work completed (with legend) of past illicit discharge investigations (e.g., closed circuit television (CCTV), flow isolation, dye testing)
- Locations of suspected, confirmed and corrected illicit discharges (with dates and flow estimates)

3.1 MS4 Mapping Status

The Town of Hampden has completed initial mapping of the MS4 using existing plans and field work to obtain locations of drainage system elements using Global Positioning System (GPS). A working draft of the drainage system map is included in **Appendix D**. Up-to-date mapping is available from the Hampden Highway Department. As of the date of this report, the following elements are mapped within the Urbanized Area:

- Receiving waterbodies
- 68 known outfalls
- Initial catchment delineations
- Connectivity of some areas
- All sub-watersheds

The mapping requirements of the 2003 Small MS4 General Permit have been met, and the requirements of the 2016 Small MS4 General Permit are underway. The mapping element totals listed above are subject to change as the Town completes ongoing mapping improvement efforts. Additional mapping is needed to confirm the connectivity of the system and number of outfalls, as well as add attribute data to the structures. As the mapping effort progresses, **Appendix D** should be updated to reflect changes and additions to the system mapping and MS4 inventory.

3.2 Outfall/Interconnection Inventory

The Town must develop and maintain an inventory of all of the Town's outfalls and interconnections. This inventory identifies each outfall discharging from the MS4, records its location and condition, and provides a framework for tracking inspections, screenings, and other activities under the Town's IDDE Program. Refer to **Appendix D** for the initial outfall/interconnection inventory and priority ranking, initial catchment delineations, and working copies of associated drainage system maps.

Per Section 2.3.4.7.b.iii of the 2016 Small MS4 General Permit, the outfall/interconnection inventory shall include the following information:

- 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) as of the most recent inspection.

The initial inventory in **Appendix D** was created from the existing GIS data and supplemented with record drawings and field measurements and observations. Tighe & Bond also created an application with ArcGIS online for mobile data collection with the Town's iPad, using the outfall investigation form in **Appendix F**. Location information was collected with a handheld GPS and input into a GIS database. GPS accuracy of a smart phone or tablet is sufficient to meet permit requirements. The Town's Sampling Protocol and relevant SOPs for sampling and analysis are available in **Appendix F.**

3.3 Action Plan

Action Items: Stormwater System Mapping	
1. Maintain Outfall Inventory	The inventory shall be updated annually to include data collected in connection with the dry weather screening and other relevant inspections conducted by the Town or consultants. The inventory shall be included with each Annual Report.
2. Continue to Improve Drainage Mapping and Asset Inventory	Phase 1 mapping must be completed within two years of the effective date of the permit. The next priority will be identifying Town-owned BMPs. Phase 2 mapping will be completed within ten years of the effective date of the permit and includes catchment delineations, pipes, manholes, and catch basins. Throughout the permit term, the map will be updated as necessary to reflect newly discovered information, corrections or modifications, significant changes, and progress made. Updated maps may be added to **Appendix D** annually or kept electronically. When Annual Reports are prepared, the Town should print or save a pdf of the most up-to-date system map to document progress.
3. Map Availability and Data Management	The MS4 map is critical for the IDDE Program, outfall monitoring program, MS4 maintenance activities, and spill response and should be made accessible to Town personnel in a usable format (e.g., paper field maps or electronic on handheld device). All personnel should be encouraged to report mapping errors, omissions, or other updates to the Highway Department.

Section 4
Non-Stormwater Discharge Bylaw

4.1 Stormwater Management By-Law

The Town of Hampden has developed a general bylaw to regulate non-stormwater discharges to the MS4. The *Stormwater Management Bylaw* was approved as Chapter XIV of the Town of Hampden General Bylaws on April 25, 2005. This by-law prohibits illicit discharges to the Town's drainage system. A complete copy of the *Stormwater Management Bylaw* is included as part of this plan in **Appendix A**. The Board is Selectmen or its designated agent is designated to administer, implement, and enforce this bylaw, which meets the requirements of the 2016 Small MS4 General Permit.

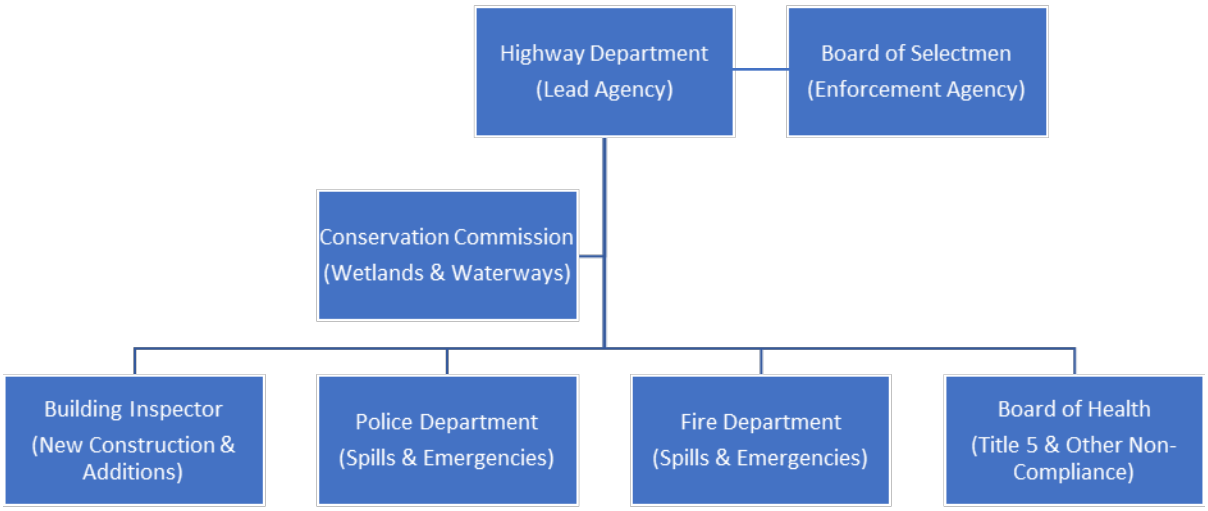
4.2 Action Plan

Action Items: Illicit Discharge Bylaw	
1. Implement Bylaw.	The Town's *Stormwater Management* Bylaw shall be enforced when necessary for illicit discharges, illegal connections, and illegal dumping. Recommended procedures to require a private property owner to remove an illicit discharge are provided in **Appendix E**.

Section 5
Statement of IDDE Program Responsibilities

5.1 Protocol for IDDE Program Responsibilities

The Highway Department is responsible for overseeing and implementing the IDDE Program. However, according to the Town's *Stormwater Management Bylaw*, the Town's Board of Selectmen have the authority to enforce the prohibition of illicit discharges, connections, and obstructions to the MS4. Additional authority for prohibition of illicit discharges and illegal dumping to the MS4 and water bodies in Hampden is granted to the Conservation Commission through the Massachusetts Wetlands Protection Act and Regulations.



Establishing procedures to coordinate Town personnel and departments is an important component of the IDDE Program and is required under Section 2.3.4.6.b of the 2016 Small MS4 General Permit. Hampden's protocol for IDDE Program responsibilities is provided in **Appendix E**. This statement is written in accordance with the requirements of the 2016 Small MS4 General Permit, and includes an explanation of specific areas of responsibility and a process for coordination and data sharing among various Town departments and personnel.

The following provides a summary of responsibilities with regard to finding and removing illicit discharges:

- The **Board of Selectmen** has the authority to enforce the prohibition of illicit discharges, connections, and obstructions to the MS4. The Highway Department is the authorized agent of the Board of Selectmen for implementing the IDDE Program.
- The **Highway Department** is designated to administer and implement the IDDE Program. The Highway Department serves as the lead local agency to manage the Town's IDDE Program and address EPA's permit requirements.
- The **Building Inspector** notifies the Fire Department or the Highway Department, depending on the size of the spill, with a phone call when any spills are identified in the course of building inspections.

- The **Fire and Police Departments** are generally the first responders to accidents on roadways that would lead to an emergency spill that would affect the Town's storm drain infrastructure. When public utilities are affected, the Highway Department is notified via a phone call to the Highway Department Superintendent.
- The **Health Department** is responsible for overseeing Title 5 inspection results. Any septic related problems or complaints are handled by the Health Department, who notifies the Highway Department if any action is required on the part of the Highway Department.

5.2 Action Plan

Action Items: Statement of IDDE Program Responsibilities	
1. Update Protocol for IDDE Program Responsibilities as Needed	The Highway Department and Board of Selectmen, with assistance from other relevant staff, may update or amend the written statement that identifies responsibilities with regard to eliminating illicit discharges. The most up-to-date Protocol for IDDE Program Responsibilities should be maintained in **Appendix E**. See also Section 8.
2. Employee Training (see Section 9.2)	Train responsible Town personnel on the written IDDE protocol as part of the Annual Employee Trainings.

Section 6
Assessment and Priority Ranking of Outfalls and Interconnections

In assessing the storm drain system for illicit connections and discharges, prioritization helps focus energies on areas of greatest concern or where the greatest impact would be achieved. Since 2003, the Town of Hampden has generally prioritized areas discharging to the Scantic River; industrial areas; and recreational areas. Additionally, per the 2016 Small MS4 General Permit, "the ranking will determine the priority order for the screening of outfalls and interconnections pursuant to part 2.3.4.7.b", and the compliance schedule for catchment investigations is based on this ranking.

6.1 Priority Ranking

Outfalls and interconnections, and their associated catchments must be assessed in terms of their potential to have illicit discharges and/or SSOs, and the related public health significance. The illicit discharge potential assessment and priority ranking based on that assessment will determine the order of outfall and interconnection screening and schedule for catchment investigations. The assessment also provides the basis for determining IDDE Program milestones.

Outfalls and their associated catchments were ranked into the following categories based on potential for illicit discharges:

- **Excluded Outfalls**: 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
- **Problem Outfalls**: outfalls/interconnections with known or suspected contributions of illicit discharges based on existing information are designated as Problem Outfalls, including any outfalls/interconnections where previous screening indicates likely sewer input
- **High Priority Outfalls**: outfalls/interconnections that have not been classified as Problem Outfalls and that are: 1) discharging to an area of concern to public health due to proximity of public beaches, recreational areas, drinking water supplies or shellfish beds; or 2) determined by the permittee as high priority based on the characteristics listed in the permit or other available information; and
- **Low Priority Outfalls**: outfalls/interconnections determined by the permittee as low priority based on the characteristics listed in the permit or other available information.

The characteristics of each of these categories have been defined by EPA in the 2016 Small MS4 General Permit Section 2.3.4.7.a.ii and iii.

Within each of these four ranking categories, the catchments will also be ranked based on screening factors. Per section 2.3.4.7.a.iii. of the 2016 Small MS4 General Permit, EPA's **minimum screening factors** for priority ranking of outfalls include:

- Past discharge complaints and reports.
- Poor dry weather 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 0.50 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 surrounding 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 – Catchments that were once serviced by septic systems, but have been converted to sewer connections may have a high illicit discharge potential.
- 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 be considered "high."
- Water quality limited waterbodies that receive a discharge from the MS4 or waters with approved total maximum daily loads (TMDLs) applicable to the permittee, where illicit discharges have the potential to contain the pollutant identified as the cause of the water quality impairment.

An initial priority ranking of outfalls and interconnections with the associated catchment areas has been completed using the screening criteria presented above. Based on this initial ranking, there are no Problem or Excluded outfalls in Hampden. Additional information is located in **Appendix D**, which includes the initial outfall/interconnection inventory and ranking, a memorandum describing the ranking methodology and assumptions, the associated catchment rankings, and a map of the preliminary catchment delineations and ranking.

6.2 Action Plan

Action Items: Assessment and Priority Ranking of Outfalls/ Interconnections	
1. Update Illicit Discharge Potential Assessment and Priority Ranking	An initial illicit discharge potential assessment and priority ranking based on existing information was completed as part of this Program and is located in **Appendix D**. The Town shall update its assessment and priority ranking continuously based on catchment delineations, the results of screening, and other new relevant information. The updated ranking shall be complete within three years of the effective date of the permit per section 2.3.4.7.c of the 2016 Small MS4 General Permit.

Section 7
Identification of Illicit Discharges

A key component of the IDDE Program is written procedures for screening and sampling outfalls and interconnections from the MS4 in dry and wet weather for evidence of illicit discharges and SSOs. This section summarizes the written procedures that the Town should use to identify illicit discharges and makes recommendations for prioritizing catchment investigations. These procedures heavily rely on the January 2012 Draft EPA New England Bacterial Source Tracking Protocol as well as guidelines from the Center for Watershed Protection.

Note that certain discharges are permitted through the EPA and MassDEP via other NPDES permitting programs, including the Municipal Wastewater and Industrial Wastewater permit programs. Outfalls permitted through these programs are not part of the Town's MS4 because they have different requirements and individual permits and plans. They do not need to be inventoried or monitored as part of the IDDE investigations. Based on the EPA's Enforcement and Compliance History Online (ECHO) website (https://echo.epa.gov) and discussion with the Town, there are currently no facilities within Hampden that are permitted through other NPDES permitting programs.

7.1 Dry Weather Outfall and Interconnection Screening and Sampling

7.0.1 Procedures and Guidance

The Town will screen and sample outfalls and interconnections in accordance with the requirements in the 2016 Small MS4 General Permit. Per the 2016 Small MS4 General Permit, all outfalls (excluding Problem and Excluded outfalls) are required to be inspected for the presence of dry weather flow (when no more than 0.1 inches of rainfall has occurred within the previous 24-hour period and no significant snow melt is occurring) within three years of the effective permit date.

The following procedures and guidance are included in **Appendix F**.

- Outfall Field Sheet, Adapted from Center for Watershed Protection's IDDE Manual
- Hampden Sampling Protocol and Field Equipment Checklist
- Chapter 11 of the Center for Watershed Protection's IDDE Manual, "Outfall Reconnaissance Inventory"
- Chapter 13 of the Center for Watershed Protection's IDDE Manual, "Tracking Discharges to a Source"
- EPA New England Bacterial Source Tracking Protocol, Draft 2012

7.0.2 Impaired Waterbodies

Specific impairments are compiled for Massachusetts's waterbodies in an Integrated List of Waters, which becomes the EPA's 303(d) list once finalized. The most recent 303(d) list is from 2014, which does not identify any impaired waterbodies within the Town of Hampden.

However, as the Town is located within the Connecticut River watershed, it is subject to the Long Island Sound Nitrogen TMDL, and outfall sampling should include analysis for Nitrogen, as described in the Dry Weather Sampling Procedure included in **Appendix F**.

Note that a draft 2016 Integrated List of Waters is available from MassDEP, which lists the Scantic River as a Category 5 water requiring a TMDL for an *Escherichia coli* impairment. However, the 2016 Integrated List of Waters has not been finalized and is not the official EPA 303(d) list; therefore, the Dry Weather Sampling Procedure in **Appendix F** has been developed based on the 2014 Integrated List. Excerpts from the final 2014 and draft 2016 Integrated Lists are included in Appendix G, with notes about the differences between the Lists.

7.2 Catchment Investigation Procedure

The Town's IDDE Program must include a written, systematic procedure for catchment investigation that includes:

1. A review of mapping and historic plans and records for the catchment;
2. A manhole inspection methodology; and
3. Procedures to isolate and confirm sources of illicit discharges.

Hampden will use the following procedure to evaluate and investigate each catchment according to section 2.3.4.8 of the 2016 Small MS4 General Permit.

7.2.1 Review of Mapping and Historic Plans

Based on relevant mapping and historic plans and records (to the extent available), the Town must identify and record the presence of any of the System Vulnerability Factors as defined by Section 2.3.4.8.c.i, include the following situations:

- 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 both 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



Strategically identifying and limiting the number of "key junction manholes" is essential to minimizing the IDDE Program level of effort and cost.

- 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.

The following items are recommended for assessment as System Vulnerability Factors, although they are not required:

- 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**
- **History of multiple Board of Health actions addressing widespread septic system failures**

Where one or more of these System Vulnerability Factors are present, the Town must sample and inspect the catchment area during wet weather conditions to determine whether wet weather-induced high flows in sanitary sewers or high groundwater in areas served by septic systems result in the discharge of sanitary flow to the MS4. The relevant factors to Southampton are highlighted in bold text above. The Town shall evaluate System Vulnerability Factors to determine where wet weather sampling will be required and document the results in **Appendix D**.

7.2.2 Manhole Inspection Methodology

The Town shall systematically and progressively observe, sample, and evaluate all **key junction manholes** to locate evidence of illicit discharges. A **junction manhole** is defined as a manhole or manhole structure with two or more inlets accepting flow from two or more MS4 alignments. **Key junction manholes** are defined as junction manholes that can represent one or more junction manholes without compromising adequate implementation of the illicit discharge program.

The Town will begin at the most downstream key junction manhole (nearest to the outfall) and work upstream. Catchment investigations will be done in dry weather. Outfalls will only be screened during wet weather per Section 2.3.4.8.c.ii.2 where System Vulnerability Factors (see Section 7.2.1) have been identified. For manhole inspections, the Town will rely on in situ water quality screening such that a sample will be collected for laboratory analysis only if in situ field screening indicates a possible illicit discharge. Refer to Hampden's Sampling Protocol and Chapter 13 of the Center for Watershed Protection IDDE Manual in **Appendix F** for additional information regarding laboratory analysis parameters for Hampden's receiving waters.

Where water quality screening, sampling results, and/or visual and olfactory observations indicate a potential illicit discharge, the upstream area will be flagged for additional investigation and/or isolation and confirmation of sources (see Section 7.2.3).

The schedule to complete catchment investigations depends on the catchment priority ranking as updated after dry weather screening (see Action Item 1 in Section 6). Program milestones are in Section 7.3.

7.2.3 Procedures to Isolate and Confirm Sources

Chapter 13 of the Center for Watershed Protection IDDE Manual, "Tracking Discharges to a Source" is included in **Appendix F**. The Town will use this chapter as a guide for isolating and confirming sources of illicit discharges.

7.3 Catchment Investigation Timeline

According to the 2016 Small MS4 General Permit section 2.3.4.8.a, the following schedule is applicable to the Town of Hampden's investigation of catchments.

Catchment Investigation Requirement	PY 1	PY 1.5	PY 2	PY 3	PY 4	PY 5	PY 6	PY 7	PY 8	PY 9	PY 10
Develop written catchment investigation procedure		●									
Investigations of catchments associated with Problem Outfalls			■	→	→	→	→	●			
Investigations of catchments with likely sewer input				■	→	→	→	●			
Investigations of catchments associated with High and Low Priority Outfalls				■	→	→	→	→	→	→	●

■ Year investigations required to begin

→ Ongoing investigations

● Year due

7.4 Action Plan

Action Items: Identification of Illicit Discharges	
1. Outfall and Interconnection Dry Weather Screening	The Town shall complete dry weather screening and sampling (where flowing) of every MS4 outfall and interconnection no later than three years from the effective date of the permit. Catchments where screening indicates a possible sanitary sewer input shall be ranked as High Priority for catchment investigations (see Section 6).
2. Identify Key Junction Manholes	The Town must identify key junction manholes, as defined in the 2016 Small MS4 General Permit, within each catchment area beginning with Problem and High Priority catchments identified according to Section 6. To the extent allowed, the Town should minimize the number of key junction manholes. Key junction manholes should be included in the Catchment Investigation Procedure, due within 18 months of the effective date of the permit.

Action Items: Identification of Illicit Discharges	
3. Develop and Implement Catchment Investigation Procedure	The Town will develop and implement the Catchment Investigation Procedure described in Section 7.2 according to the schedule in Section 7.3. Documentation that tracks progress towards these goals should be kept in **Appendix I;** large reports may be filed separately.
4. System Vulnerability Factors and Wet Weather Screening	EPA guidance will be used to determine whether one or more System Vulnerability Factors are present in catchment areas (refer to Section 7.2, Catchment Investigation Procedure, and the Initial Catchment Ranking in **Appendix D**). System Vulnerability Factors focus on potential for sanitary wastewater to discharge into the MS4 or environment. They must be recorded and reported annually for each catchment. For catchments with one or more System Vulnerability Factors, wet weather screening is required by the 2016 Small MS4 General Permit.
5. Ongoing Manhole Investigations and Outfall Monitoring Program	The Town will continue to perform dry and wet weather outfall and interconnection screening required in the 2016 Small MS4 General Permit in conjunction with the Catchment Investigation Procedure, such as confirmatory screenings and follow-up screenings. Documentation of outfall Screening and sampling should be added to **Appendix I** as it is available.

Section 8
Illicit Discharges Removal and Confirmation Screening

8.1 Removal of Illicit Discharges

Most corrective actions for an illicit discharge, once isolated, will involve some kind of infrastructure modification or repair. Structural repairs can range from simple plumbing projects to excavation and replacement of sewer lines, and can be used to eliminate a wide variety of *direct discharges* such as sewage, industrial, and commercial cross-connections. Structural repairs may also be necessary for *indirect discharges*, such as discharges from a failing septic system or washwater discharged outdoors, when the discharge enters an MS4 inlet or flows directly into receiving waters. Most *transitory discharges*, such as a liquid or oil spill or illegal dumping, are corrected simply with spill containment and clean-up procedures.

Recommended procedures to require a property owner to remove an illicit discharge are provided in **Appendix E**. This section discusses additional requirements and considerations for Hampden.[5]

8.1 Compliance Schedule and Reporting to EPA

Per Section 2.3.4.2 of the 2016 Small MS4 General Permit, the Town must eliminate all illicit discharges or establish a schedule for elimination within 60 days of detection:

> **2.3.4.2 Elimination of Illicit Discharges**
>
> a. Upon detection of an illicit discharge, the Town shall locate, identify, and eliminate the illicit discharge as expeditiously as possible. Upon identification of the illicit source the Town shall notify all responsible parties for any such discharge and require immediate cessation of improper disposal practices in accordance with the Town bylaw. Where elimination of an illicit discharge within 60 days of its identification as an illicit discharge is not possible, the Town shall establish an expeditious schedule for its elimination and report the dates of identification and schedules for removal in the Town's annual reports. The Town shall immediately commence actions necessary for elimination. The Town shall diligently pursue elimination of all illicit discharges. In the interim, the Town 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 the General Permit and remain unlawful until eliminated.

[5] Section 8.1 text is adapted from the Center for Watershed Protection's 2004 IDDE guidance manual, available online at https://www3.epa.gov/npdes/pubs/idde_manualwithappendices.pdf.

The Town shall include the following information in the Annual Report for each confirmed source:

- The location of the discharge and its source(s)
- A description of the discharge
- The date and method of discovery
- The date of elimination or planned corrective measures and a schedule for completing the illicit discharge removal
- Mitigation or enforcement action
- An estimate of the volume of flow removed

This information and additional reporting requirements will be used in evaluating IDDE Program progress and is further described in Section 10.

8.2 Confirmation Screening

Within one year of removal of all identified illicit discharge sources, confirmatory outfall or interconnection screening shall be conducted according to the 2016 Small MS4 General Permit requirements. The confirmatory screening shall be conducted in dry weather unless System Vulnerability Factors have been identified in the catchment as described in Section 7.2, 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. Confirmatory screening is not required in catchments where no illicit discharges or System Vulnerability Factors have been identified and no previous screening indicated suspicious flows. Refer to the Flow Chart for Corrective Action in **Appendix E** for additional information about the process for eliminating an illicit discharge.

8.3 Ongoing Screening

Upon completion of catchment investigation Section 7.2 and illicit discharge removal and confirmation (if necessary) pursuant to this Section, EPA requires that “each outfall or interconnection shall be reprioritized for screening in accordance with part 2.3.4.8.a and scheduled for ongoing screening once every five years.” Follow-up screening shall consist of dry weather screening and sampling except that wet weather screening and sampling shall also be required in catchments where wet weather screening was required by Section 7.2.1.

8.4 Action Plan

Action Items: Removal and Confirmation	
1. Follow Protocol and Document Actions	If an illicit connection or discharge is discovered, it is critical that the Town carefully adhere to protocol for removal, enforcement, and documentation described in this section, **Appendix E**, and in the 2016 Small MS4 General Permit. If an illicit connection or discharge cannot be removed within 60 days, the Town must establish a schedule for elimination and include the schedule and the date the connection or discharge was identified in Annual Reports.
2. Formalize Illicit Discharge Tracking	Formalize the tracking methodology for illicit discharge and connection discoveries, removal, and confirmation. Store data in a common repository so multiple Town departments can access and update as needed.

Section 9
Illicit Discharge Prevention

Elimination and ongoing prevention of illicit discharges are the ultimate goals of the IDDE Program. The following provides options for the Town of Hampden to educate the public about illicit discharges and train municipal employees on the identification and elimination of known illicit discharges.

9.1 Public Education

Education is a useful tool in preventing illicit discharges. The 2003 Small MS4 General Permit required that the Town inform public employees, businesses, and the general public of hazards associated with illegal discharge and improper waste disposal.

The 2016 Small MS4 General Permit requirements for Southampton public education include the following:

- Over the course of the permit term, Hampden must distribute a minimum of two messages to each of four audiences (residential, business/institutions, developers, and industrial).
- As an MS4 located within the Connecticut River watershed and subject to the Long Island Sound Nitrogen TMDL requirements outlined in Appendix F, Section B.1 of the 2016 Small MS4 General Permit, specific timed messages to residents and businesses/institutions/commercial facilities are required:
    - Annual message in the spring (Apr/May) that encourages proper use and disposal of grass clippings and encourages use of slow-release fertilizers
    - Annual message in the summer (Jun/Jul) that encourages proper management of pet waste
    - Annual message in the fall (Aug/Sept/Oct) that encourages proper disposal of leaf litter

Hampden may incorporate various educational activities into the Public Education Program with the goal of preventing illicit discharges to the drainage systems.

- Educate the public on illicit discharges and the impacts to the human health and the environment.
- Encourage awareness and promote stewardship of the storm drain system in neighborhoods. This may be accomplished through catch basin stencils or markers.
- Educate the public about the IDDE Program, Hampden's *Stormwater Management* Bylaw, and the consequences of violations.
- Post "No Dumping" signs at key locations to discourage illegal dumping by threatening fine or imprisonment.

The target audience for education on illicit discharges and illegal dumping should include residents, businesses, institutions, commercial facilities, developers, and industrial facilities. Materials for public outreach can be obtained from the Pioneer Valley Planning Commission's Connecticut Stormwater Committee, the Massachusetts Think Blue website (https://www.thinkbluemassachusetts.org/), EPA Region 1's Stormwater Tools in New England website (https://www.epa.gov/npdes-permits/stormwater-tools-new-england) or other state and regional groups.

9.2 Annual Employee Training

The Town shall, at a minimum, annually provide training to employees involved in the IDDE Program, including how to recognize illicit discharges and SSOs, and procedures to find and eliminate illicit discharges in accordance with this Plan. Town employees should be trained, particularly those that spend time doing site visits and drain system inspections. Town departments/boards that should receive training include, but are not limited to, Highway Department, Conservation Commission, Boards of Selectmen, Planning, and Health.

The Town shall report on the frequency and type of employee training in the Annual Report. Trainings can be either conducted for Hampden staff only or key Town personnel may attend outside training to meet this requirement (such as trainings hosted by EPA, MassDEP, or the PVPC CRSWC).



Training Town staff and contractors that clean catch basins is a cost-efficient way to identify and report illicit discharges.

9.3 Action Plan

Action Items: Illicit Discharge Prevention Procedures	
1. Continue Public Education	When developing Hampden's Stormwater Management Program under the 2016 Small MS4 General Permit, include messaging to all four target audiences about illicit discharges and illegal dumping.
2. Develop an IDDE Training Program	The Town of Hampden must develop an employee training program, to be conducted annually, as described in section 9.2. The training program outline, presentations and materials, and sign-in sheets should be added to **Appendix I**. The IDDE training can be periodically combined with other required training topics, such as good housekeeping and pollution prevention.
3. Follow Spill Prevention and Response Procedures	The Protocol for IDDE Program Responsibilities in **Appendix E** should be followed. Maintain the Oil Spill Prevention, Control, and Countermeasure (SPCC) Plan at the Hampden Highway Department. Coordinate with the Fire Department regarding spills and emergencies per the protocol established in the SPCC Plan. Update mapping and procedures as necessary.

Section 10
Evaluation of IDDE Program Progress and Reporting

The Town shall define or describe indicators for tracking program success. At a minimum, indicators shall include measures that demonstrate efforts to locate illicit discharges. Section 2.3.4.9 of the 2016 Small MS4 General Permit includes the minimum indicators for tracking of program success. These indicators are as follows:

- The number of 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
- The volume of sewage removed.

In addition to the above measures of success, the Town will decide additional tracking indicators on a case by case basis and include in the SWMP. The Town shall evaluate and report the overall effectiveness of the program based on the tracking indicators in the Annual Report.

Records must be kept for at least five years per Section 4.2.a of the 2016 Small MS4 General Permit. IDDE Program records to be kept include:

- Information used in the development of the written IDDE Program
- Any monitoring results
- Copies of reports
- Records of screening
- Follow-up and elimination of illicit discharges
- Maintenance records
- Inspection records

10.1 Reporting

All outfall monitoring and screening results shall be documented and reported on annually in the Annual Reports. Outfall monitoring results shall include:

- Date
- Outfall or interconnection identifier
- Location
- Weather conditions at time of sampling
- Precipitation in previous 48 hours
- Field screening parameter results
- Results of all analyses

Results of any other stormwater or receiving water quality monitoring or studies conducted during the reporting period where that data is being used by the Town to inform permit compliance or program effectiveness shall also be reported in the Annual Report per Section 4.3 of the 2016 Small MS4 General Permit.

In addition, the Town must report on the activities related to implementation of the IDDE Program in their Annual Reports according to section 4.4.b.iv of the Massachusetts Small MS4 GP. These activities include:

- 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 of the permit (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
- Employee training

10.2 Action Plan

Action Items: Evaluation of IDDE Program	
1. Track Indicators of IDDE Program Success	The Town will track the indicators of IDDE Program Success, as listed in this Section and report on them annually. The Town may include additional tracking indicators to aid in the annual evaluation.
2. Record Keeping	The Town will keep records of all IDDE-related activities in the Highway Department office. The majority of IDDE records will be maintained electronically and in **Appendix H** of this Plan; large reports may be filed separately. Record keeping requirements are described in this Plan, and include: • Outfall Inventory: dates, outfall location/ID, field observations. • Outfall Monitoring: dates, outfall location/ID, field observations, in situ and laboratory results, precipitation previous 48 hours. • SSO Inventory: date, status of corrective measures • Location, structure ID, pollutants of concern for suspected illicit discharges. • Log of follow-up activities to confirm and locate illicit discharge: dates, locations, personnel, actions taken. • Log of phone calls and complaints received regarding suspected illicit connections and storm drain issues: concerns, locations, actions taken, and dates.

Action Items: Evaluation of IDDE Program	
	• Employee Training: dates, attendance sheet, and topics (include handouts or visuals if used). • Information used in the development of the IDDE Program. • Inspection and maintenance records.
3. Annual Evaluation of IDDE Program Effectiveness	The Town will annually summarize and evaluate IDDE Program progress based on the EPA's requirements and tracking indicators in the Annual Report to the EPA and MassDEP.

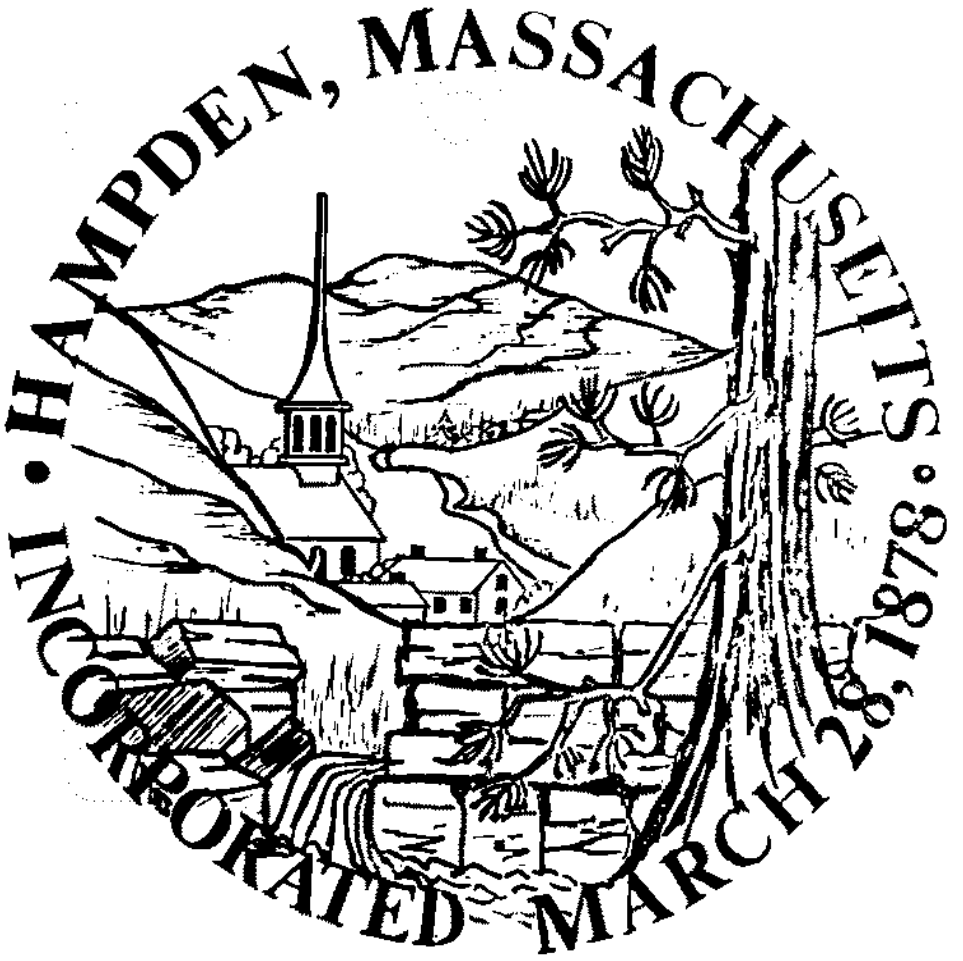
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Town of Hampden IDDE Program

Appendix A

Stormwater Bylaw

General Bylaws



Town of Hampden Massachusetts

CHAPTER 1 – INTRODUCTION

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CHAPTER XIV (A)- EROSION AND SEDIMENT CONTROL FOR STORMWATER MANAGEMENT

existing surfaces of such ways, but may include surfacing the ways with bituminous materials, including but not limited to bituminous concrete.

Drainage, as determined by the Highway Superintendent to be necessary as a result of the repairs, may also be done. Drain repairs shall be made only if petitioned for by all the abutters who own frontage on such ways with the approval of the land owner, if necessary, and if the Board of Selectmen declare that they are required by the public necessity and convenience to make such repairs based on an advisory opinion of the Highway Superintendent. Drainage easements shall, if necessary, be the responsibility of the petitioners. The cost of such repairs shall be paid by the abutters by a cash deposit as herein provided.

No repairs shall be commenced unless and until a cash deposit equal in amount to the estimated cost of such repairs, as determined by the Highway Superintendent, is paid over to the Town and the Board of Selectmen has given its approval for the project. No betterment charges shall be assessed.

The Town shall not be liable on account of any damage whatsoever caused by such repairs and Section 25 of Chapter 84 shall not apply. The Board of Selectmen may require an indemnity agreement executed by the petitioning abutters, indemnifying the Town for all claims and damages, which may result from changing such repairs.

The Town may, subject to the approval of the Board of Selectmen and based on an advisory report from the Highway Superintendent, make temporary minor repairs to private ways not to exceed $500 per road per year, in total, provided the private way has been open to public use for a period of six years or more. The repair shall be limited to minor work such as filling, patching, and not more than grading or scraping twice per year.

No such repairs shall be done unless there is a unanimous agreement by all abutters that the work shall commence and the Town of Hampden shall be held harmless from any and all damages or claims arising out of such repairs. Massachusetts General Laws, Chapter 84, Section 25 shall not apply.

CHAPTER XIV STORMWATER MANAGEMENT

(Approved April 25, 2005)

1. PURPOSE

The purpose of this chapter is to eliminate non-stormwater discharges to the Town of Hampden's Municipal Storm Drain System. Non-stormwater discharges contain contaminants and supply additional flows to the Town of Hampden's Storm Drain System. Non-stormwater discharges are major causes of:

a. impairment of water quality and flow in lakes, ponds, streams, rivers, wetlands, and groundwater;
b. contamination of drinking water supplies;
c. alteration or destruction of aquatic and wildlife habitat; and
d. flooding.

Regulation of illicit connections and discharges to the storm drain system is necessary for the protection of the Town of Hampden's, natural resources, municipal facilities, general health, safety, welfare, and the environment. The objectives of this section are:

a. to prevent pollutants from entering the storm drain;
b. to prohibit illicit connections and unauthorized discharges to the storm drain
c. to remove all such illicit connections;
d. to comply with state and federal statutes and regulations relating to stormwater discharges; and
e. to establish the legal authority to ensure compliance with the provisions of this section through inspection, monitoring, and enforcement.

2. DEFINITIONS

These definitions and provisions shall apply to the "Discharges to the Municipal Drain System" By-Law.

AUTHORIZED ENFORCEMENT AGENCY - The Board of Selectman, its employees or agents designated to enforce this by-law.

BEST MANAGEMENT PRACTICE (BMP) - An activity, procedure, restraint, or structural improvement that helps reduce the quantity or improve quality of stormwater runoff.

CLEAN WATER ACT - The Federal Water Pollution Control Act (33 U.S.C. section 1251 *et seq.*) and as it is amended from time to time.

DISCHARGE OF POLLUTANTS - The addition from any source of any pollutant or combination of pollutants into the storm drain or into waters of the United States or Commonwealth from any source.

GROUNDWATER - Water beneath the surface of the ground. Except where the water under the ground is the result of a perched water table.

ILLICIT CONNECTION - A surface or subsurface drain or conveyance, which allows an illicit discharge into the storm drain, including without limitation sewage, process wastewater, or wash water and any connections from indoor drains, sinks, or toilets, regardless of whether said connection was previously allowed, permitted, or approved before the effective date of this by-law.

ILLICIT DISCHARGE - Direct or indirect discharge to the storm drain that is not composed entirely of stormwater, except as exempted in Section 7. The term does not include a discharge in compliance with an NPDES Storm Water Discharge Permit or resulting from fire fighting activities exempted pursuant to Section 7, subsection d, part 1, of this by-law.

IMPERVIOUS SURFACE - Any material or structure on or above the ground that prevents water infiltrating the underlying soil. Impervious surface includes without limitation roads, paved parking lots, sidewalks, and rooftops.

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) - The system of conveyances designed or used for collecting or conveying stormwater, including any road with a drainage system, street, gutter, curb, inlet, piped storm drain, pumping facility, retention or detention basin, natural or man-made or altered drainage channel, reservoir, and other drainage structure that together comprise the storm drainage system owned or operated by the Town of Hampden.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORM WATER DISCHARGE PERMIT - A permit issued by the United States Environmental Protection Agency or jointly with the State of Massachusetts that authorizes the discharge of pollutants to waters of the United States or Commonwealth.

NON-STORMWATER DISCHARGE - Discharge to the storm drain not comprised entirely of stormwater.

PERSON - An individual, partnership, association, firm, company, trust, corporation, agency, authority, department or political subdivision of the Commonwealth or the federal government, to the extent permitted by law, and any officer, employee, or agent of such person.

POLLUTANT - Any element or property of sewage, residential, agricultural, industrial, or commercial waste, runoff, leachate, heated effluent, or other matter whether originating at a point or non-point source, that is or may be introduced into any storm drain system, waters of the United States, and/or Commonwealth. Pollutants shall include without limitation:

1. paints, varnishes, solvents;
2. oil, grease, antifreeze, other automotive fluids and/or products;
3. non-hazardous liquid and solid wastes;
4. refuse, garbage, litter, rubbish, yard wastes, or other discarded or abandoned objects, ordnances, accumulations and floatables;

5. pesticides, herbicides, and fertilizers;
6. hazardous materials and wastes;
7. sewage;
8. dissolved and particulate metals;
9. metal objects or materials;
10. animal wastes;
11. rock, sand, salt, soils, or other products/materials that mobilize in surface water runoff;
12. and construction wastes and/or residues.

PROCESS WASTEWATER - Water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any material, intermediate product, finished product, or waste product.

RECHARGE - The process by which groundwater is replenished by precipitation through the percolation of runoff and surface water through the soil.

STORMWATER - Runoff from precipitation or snowmelt.

TOXIC OR HAZARDOUS MATERIAL or WASTE - Any material, which because of its quantity, concentration, chemical, corrosive, flammable, reactive, toxic, infectious or radioactive characteristics, either separately or in combination with any substance or substances, constitutes a present or potential threat to human health, safety, welfare or to the environment. Toxic or hazardous material including without limitation:

1. any synthetic organic chemical;
2. petroleum products;
3. heavy metals;
4. radioactive or infectious waste;
5. acid and alkali substances;
6. any substance defined as Toxic or Hazardous under G.L. Ch. 21C and Ch. 21E, and the regulations at 310 CMR 30.000 and 310 CMR 40.000;
7. and any substance listed as hazardous under 40 CFR 261.

WATERCOURSE - A natural or man-made channel through which water flows or a stream of water, including a river, brook or underground stream.

WATERS OF THE COMMONWEALTH - All waters within the jurisdiction of the Commonwealth, including, without limitation, rivers, streams, lakes, ponds, springs, impoundments, estuaries, wetlands, coastal waters, and groundwater.

WASTEWATER - Any sanitary waste, sludge, or septic tank or cesspool overflow, and water that during manufacturing, cleaning or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, by-product or waste product.

3. APPLICABILITY

This section shall apply to flows entering the municipally owned and/or operated storm drainage system.

4. AUTHORITY

This by-law is adopted under the authority granted by the Home Rule Amendment of the Massachusetts Constitution, the Home Rule statutes, and the regulations of the federal Clean Water Act 40 CFR 122.34.

5. RESPONSIBILITY FOR ADMINISTRATION

The Board of Selectmen shall administer, implement and enforce this by-law. Any powers granted to or duties imposed upon the Board of Selectmen to promulgate such rules and regulations shall not have the effect of suspending or invalidating this by-law.

6. REGULATIONS

The Board of Selectmen may promulgate rules and regulations to effectuate the purpose of by-law. Failure by the Board of Selectmen to promulgate such rules and regulations shall not have the effect of suspending or invalidating this by-law.

7. PROHIBITED ACTIVITIES

a. **ILLICIT DISCHARGES** - No person shall dump, discharge, cause or allow to be discharged any pollutant or non-stormwater discharge into the storm drain system, into a watercourse, or into waters of the United States and/or Commonwealth.

b. **ILLICIT CONNECTIONS** - No person shall construct, use, allow, maintain or continue any illicit connection to the municipal storm drain system, regardless of whether the connection was permissible under applicable law, regulation or custom at the time of connection.

c. **OBSTRUCTION OF THE MUNICIPAL STORM DRAIN SYSTEM** - No person shall obstruct or interfere with the normal flow of stormwater into or out of the municipal storm drain system without prior approval from the Board of Selectmen.

d. **EXEMPTIONS**

1. Discharge of flow resulting from fire fighting activities and Highway Department ice and snow control operations.
2. The following non-stormwater discharges or flows are considered exempt provided that the source is not a significant contributor of pollution to the municipal storm drain system:
   - i. waterline flushing;
   - ii. flow from potable water sources;
   - iii. springs;
   - iv. natural flow from riparian habitats and wetlands;
   - v. diverted stream flow;
   - vi. rising groundwater;
   - viii. uncontaminated groundwater infiltrating as defined in 40 CFR 35.2005(20), or uncontaminated pumped groundwater; water from exterior foundation drains, footing drains (not including active groundwater dewatering systems), crawl space pumps, or air conditioning condensation;
   - ix. discharge from landscape irrigation or lawn watering;
   - x. water from individual residential car washing;
   - xi. discharge from dechlorinated swimming pool water (less than one ppm chlorine) provided the water is allowed to stand for one week prior to draining and the pool is drained in such a way as not to cause a nuisance;
   - xii. discharge from street sweeping;
   - xiii. dye testing, provided verbal notification is given to the Board of Selectmen prior to the time of the test;
   - xiv. non-stormwater discharge permitted under an NPDES permit, waiver, or waste discharge order administered under the authority of the United States Environmental Protection Agency, provided that the discharge is in full compliance with the requirements of the permit, waiver, or order and applicable laws and regulations;

xv. and discharge for which advanced written approval is received from the Board of Selectmen as necessary to protect public health, safety, welfare, and the environment.

8. EMERGENCY SUSPENSION OF STORM DRAINAGE SYSTEM ACCESS

The Board of Selectmen may suspend municipal storm drain system access to any person or property without prior written notice when such suspension is necessary to stop an actual or threatened discharged of pollutants that present imminent risk of harm to public health, safety, welfare or the environment. In the event any person fails to comply with an emergency suspension order, the Authorized Enforcement Agency may take all reasonable steps to prevent or minimize harm to the public, health, safety, welfare or the environment.

9. NOTIFICATION OF SPILLS

Any spills or releases that require notification under local, state or federal law will be the responsibility of the person responsible for a facility or operation, or for an emergency response for a facility or operation (i.e., construction). In the event of a spill or release which may result in a discharge of pollutants or non-stormwater discharge to the municipal storm drain system, waters of the United States, and/or waters of the Commonwealth, the responsible parties, potentially responsible parties, or any person or persons managing a site or facility shall take all necessary steps to ensure containment, and remediate any municipal storm drains that have been impacted. However, if in the opinion of Board of Selectmen, there is an excessive amount of pollutants in the storm drain system, the Board of Selectmen can require remediation by the responsible party regardless of other state or federal regulations. If the discharge of prohibited materials is from a commercial or industrial facility, the facility owner or operator of the facility shall take all necessary steps to ensure containment, clean-up of the release, retain on-site a written record of the discharge, and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

10. ENFORCEMENT

The Board of Selectmen or an authorized agent of the Board of Selectmen shall enforce this by-law, regulations, orders, violation notices, and enforcement orders, and may pursue all civil and criminal remedies for such violations.

CIVIL RELIEF - If a person violates the provisions of this by-law, regulations, permit, notice, or order issued thereunder, the Board of Selectmen may seek injunctive relief in a court of competent jurisdiction restraining the person from activities which would create further violations or compelling the person to perform abatement or remediation of the violation.

ORDERS - The Board of Selectmen or an authorized agent of the Board of Selectmen may issue a written order to enforce the provisions of this by-law or the regulations thereunder, which may include:

a. elimination of illicit connections or discharges to the MS4;

b. performance of monitoring, analyses, and reporting;

c. that unlawful discharges, practices, or operations shall cease and desist;

d. and remediation of contamination in connection with discharges to the MS4

If the enforcing person determines that abatement or remediation of contaminations is required and is the responsibility of the property *owner,* the order shall set forth a deadline by which such abatement or remediation must be completed. Said order shall further advise that, should the violator or property owner fail to abate or perform remediation within the specified deadline, the Town of Hampden may, at its option, undertake such work, and expenses times three thereof shall be charged to the violator. Within thirty (30) days after completing all measures necessary to abate the violation or to perform remediation, the violator and the property owner will be notified of the costs incurred by the Town of Hampden, including administrative costs. The violator or property owner may file a written protest objecting to the amount or basis of costs with The Board of Selectmen within thirty (30) days of receipt of the notification of the costs incurred. If the amount due is not received by the expiration of the time in which to file a protest or within thirty (30) days following a decision of the Board of Selectmen affirming or reducing the costs, or from a final decision of a court of competent jurisdiction, the costs shall become a special assessment against the property owner and shall constitute a lien on the owners

property for the amount of said costs. Interest shall begin to accrue on any unpaid costs at the statutory rate provided in G.L. Ch. 59, section 57 after the thirty-first day at which the costs first become due.

PENALTY - Any person who violates any provision of this by-law, regulation, order or permit issued thereunder, shall be punished by a fine as set forth in Chapter XI "Non Criminal Disposition of Certain Violations" of the General by-laws of the Town of Hampden.

ENTRY TO PERFORM DUTIES UNDER THIS BY-LAW - To the extent permitted by state law, or if authorized by the owner or other party in control of the property, the Board of Selectmen, its agents, officers, and employees may enter upon privately owned property for the purpose of performing their duties under this by-law and may make or cause to be made such examinations, surveys or sampling as the Board of Selectmen deems reasonably necessary

APPEALS - The decision or orders of the Board of Selectmen shall be final. Further relief shall be to a court of competent jurisdiction.

REMEDIES NOT EXCLUSIVE - The remedies listed in this by-law are not exclusive of any other remedies available under any applicable federal, state or local law.

11. SEVERABILITY

The provisions this by-law are hereby declared to be severable. If any provision, paragraph, sentence, or clause, of this by-law or the application thereof to any person, establishment, or circumstances shall be held invalid, such invalidity shall not affect the other provisions or application of this by-law.

CHAPTER XIV (A) Erosion and Sediment Control for Stormwater Management

(Adopted April 28, 2008)

SECTION 1. PURPOSE AND AUTHORITY

1. Purpose

A. The purpose of this bylaw is to better manage land development in order to protect, maintain, and enhance the public health, safety, and general welfare of the citizens of Hampden by establishing minimum requirements and procedures to control the adverse impacts associated with stormwater runoff.

B. The proper management of stormwater runoff will meet the following objectives:

1. Reduce the adverse water quality impacts of stormwater discharges to rivers, lakes, reservoirs and streams in order to attain federal water quality standards;
2. Prevent the discharge of pollutants, including hazardous chemicals, into stormwater runoff;
3. Minimize the volume and rate of stormwater which is discharged, to rivers, streams, reservoirs, and lakes that flows from any site during and following development;
4. Prevent erosion and sedimentation from land development, and reduce stream channel erosion caused by increased runoff;
5. Provide for the recharge of groundwater aquifers and maintain the base flow of streams;
6. Provide stormwater facilities that are attractive, maintain the natural integrity of the environment, and are designed to protect public safety;
7. Maintain or reduce pre-development runoff characteristics after development to the extent feasible;
8. Minimize damage to public and private property from flooding;
9. Ensure that these management controls are properly maintained.

2. Authority

The Board of Selectman, its employees or agents are designated to enforce this bylaw. The Board of Selectman shall delegate Town agencies to administer, implement and enforce this bylaw. These agencies shall be herein referred to as "Designated Agent" by powers delegated in writing the Board of Selectmen**.**

Town of Hampden IDDE Program

Appendix B

2016 Small MS4 General Permit Excerpts

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

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

Illicit Discharge Detection and Elimination (IDDE) Program Requirements for Communities in Massachusetts

Small MS4 Permit Technical Support Document, December 2016

Final Permit Requires Enhanced IDDE Program

The final Massachusetts Small Municipal Separate Storm Sewer Systems (**MS4**) permit includes enhanced requirements aimed at eliminating non-stormwater, illicit discharges (**IDs**) to MS4s. In addition to the IDDE program requirements instituted under the 2003 permit, permittees are required to: (1) update and provide additional detail to the storm sewer system map; (2) develop a more detailed IDDE Program and field procedure; (3) implement this procedure in all MS4 catchments; (4) conduct outfall monitoring; (5) eliminate illicit connections; and (6) report details annually on IDDE program implementation.

What is an Illicit Discharge?

Any discharge to an MS4 that is not comprised entirely of stormwater is an illicit discharge **(ID)** (with limited exceptions identified in the permit). IDs can be caused by a variety of sources: leaking sanitary sewers or water mains; illegal sewage connections; illegal floor drain connections; seasonal draining of swimming pools; break-out from failing septic systems; and spills and dumping.

IDs can be **continuous** (occurring most, or all of the time, such as leaking sewage), **intermittent** (occurring occasionally, such as flow from a sump pump), or **transitory** (occurring rarely, such as a spill or illegal dumping). IDs can enter the MS4 **directly** (e.g., a sanitary sewer pipe connected to a storm drain manhole) or **indirectly** (e.g. cracked and leaking sanitary sewers where exfiltrating sewage enters nearby storm drain pipes).

Unless identified as a significant contributor of pollutants, some non-stormwater discharges may not need to be addressed as part of the IDDE program, such as: flows from fire fighting activities; uncontaminated pumped groundwater; flows from footing drains; waterline flushing, and runoff from lawn irrigation (part 1.4).

Final Mapping/Inventory Requirements

The final permit requires that each drainage system outfall to a stream, pond or other water of the United States must be field inspected and inventoried. This inventory can be performed concurrently with dry weather outfall screening. The final permit specifies the information that must be collected during inventories and mapped (Table 1).

Table 1. Inventory and Mapping Requirements

Description*	Information Required
Inventory of Known Sanitary Sewer Overflows (SSOs) Discharging to the MS4 (2.3.4.4)	1. Locations of sanitary sewer overflows (SSOs); 2. A clear statement of whether the discharge entered a surface water directly or entered the MS4; 3. Dates and times of known discharges; 4. Estimated discharge volume; 5. Description of occurrence noting known or suspected sources; 6. Mitigation and corrective measures implemented; 7. Mitigation and corrective measures planned and implementation schedule.
MS4 Map (2.3.4.5)	1. Outfall locations and receiving waters; 2. Open channel conveyances; 3. Interconnections with other storm sewer systems; 4. Impaired waterbodies; 5. Delineation of catchment area draining to each outfall; 6. Names & locations of receiving waters; 7. Storm drainage infrastructure (catch basins, manholes, pipes, treatment facilities); 8. Water resource areas (beaches, drinking water sources, critical habitats); 9. Municipal sanitary sewers, if available; and 10. Municipal combined sewers, if any.
Inventory of MS4 Outfalls (2.3.4.7)	1. Outfall location and condition; 2. Unique identifier for each outfall; 3. Ranking of each outfall; 4. Inspection all outfalls within three years of the permit effective date; 5. Sampling of outfalls with flow.

** Reference to MA MS4 General Permit part*

Due to the serious health risks posed by untreated sanitary sewage, the final permit requires an inventory of known SSOs into the MS4. SSOs have a variety of causes, such as blockages, line breaks, and lapses in sewer system operation and maintenance. Upon detection of an SSO, the permittee must eliminate it as quickly as possible and take interim mitigation measures to minimize the discharge of pollutants to its MS4 (2.3.4.4). The final permit also requires that permittees develop a detailed, accurate and comprehensive MS4 map showing all storm sewer infrastructure, the drainage area (catchment) to each outfall, and features that pose a risk of illicit discharges, such as older sanitary sewers and septic systems (Figure 1). Other data such as

groundwater depths, land use, topography and impervious cover may provide useful information and are recommended for inclusion in MS4 maps.



Figure 1. The final permit requires permittees to map outfalls (green asterisk in upper right corner); drainage areas or catchments to each outfall (in red); associated storm drain inlets and pipe network (in green); sewer lines (in orange); and associated manholes like those shown here from a catchment in Franklin, MA. Geographic Information Systems (GIS) can be a valuable tool for gathering, depicting and analyzing MS4 mapping data.

Components of an IDDE Program

In addition to the inventory and mapping requirements, a comprehensive written IDDE program must be developed and implemented by the MS4 operator under the terms of the final permit. This requirement builds upon the 2003 MS4 Permit requirement that permittees develop and implement an IDDE program. This written program will outline the legal mechanisms, detection and elimination protocols and procedures, schedules, and training elements of the local IDDE program. The final permit requirements of the plan are outlined in Table 2.

A significant component of the program is the assessment and prioritization of outfalls. Among the proposed criteria to be used for this assessment are the following:

- Past discharge complaints or reports;
- Poor dry-weather water quality in the receiving waters;
- Density of generating sites;
- Age of development and infrastructure;
- Whether or not the area was converted from septic to sewer;
- Whether or not the area was previously served by combined sewer;
- Density of aging septic systems; and
- Presence of culverted streams.

Table 2. Requirements of the Written IDDE Program

Topic	Description
Legal Authority (2.3.4.a and 2.3.4.6.a)	An ordinance, bylaw or other regulatory mechanism which provides the MS4 operator the legal authority to: prohibit IDs, investigate suspected IDs, eliminate IDs, and enforce the IDDE program (already required under the 2003 Small MS4 Permit).
Protocol & Responsibilities (2.3.4.6.c)	Identifies who is responsible for eliminating known IDs or other problems. Establishes protocols to: eliminate illicit connections or other problems, document and verify the removal of IDs and track progress towards overall program goals.
Assessment and Priority Ranking of Outfalls (2.3.4.7)	Assesses the ID and SSO potential of all outfalls and priority rank them as problem, high priority, low priority, or excluded based on a number of criteria.
Catchment Investigations (2.3.4.8)	Requires a written systematic procedure to investigate each catchment with an outfall within 18 months of the permit effective date. Also must identify maps, historic plans, and records; include a manhole inspection methodology; and establish procedures to isolate, confirm, and remove sources of IDs.
Indicators of IDDE Program Progress (2.3.4.9)	Describes the indicators to be used to track progress of the program and gauge its success.
Ongoing Screening (2.3.4.10)	Consists of dry weather screening and sampling and wet weather screening and sampling once every five years upon completion of all catchment investigations.
Employee Training (2.3.4.11)	Creates a program of training on how to recognize IDs and SSOs. Training frequency and type must be documented in the annual report.

Outfall Screening and Analytical Monitoring

Based on the final permit, the MS4 operator must perform at least one dry weather screening and analytical monitoring at each outfall within three years of the permit effective date. Wet weather analytical monitoring must be conducted in accordance with part 2.3.4.8.c.ii. Monitoring and screening should begin at outfalls in those catchments deemed as having the highest risk of IDs.

Dry weather screening will be conducted when no more than 0.1 inches of rainfall has fallen in the preceding 24-hour period and no significant snow melt is occurring. Dry weather screening can be done concurrently with the outfall inventory. If the outfall is flowing, the permittee should collect a sample, record its

temperature and have the sample tested for ammonia, chlorine, conductivity, salinity, surfactants, and E. coli (if discharging to fresh water) or enterococcus (if discharging to saline or brackish water). Sensory observations (odor, water color, sheen, turbidity) should also be noted. If there is no flow at the time of observation but signs of flow are evident, the permittee should revisit the outfall during dry weather within one week, if practicable.

If the discharge is directly to impaired waters, or is included in a waste load allocation in an approved TMDL, the final permit requires that dry weather discharges must also be screened for pollutants identified as causing the impairment.

Wet weather monitoring can be performed after any storm event of sufficient intensity to produce a discharge. A water sample shall be taken and tested for the same characteristics and pollutants as for dry weather screening. If the discharge is directly to an impaired waterbody, or is included in a waste load allocation in an approved TMDL, the final permit requires that wet weather discharges must also be screened for pollutants identified as causing the impairment.

Locating Suspected Illicit Connections

The 2003 permit left it up to the permittees to determine the methods used to isolate suspected illicit connections; however the final permit explicitly stipulates minimum procedures to be followed. The locating of illicit connections requires a systematic inspection of junction manholes (manholes with two or more inflow pipes), starting at either the upstream end of a storm drain network and progressing downstream, or vice versa. Key junction manholes must be opened, and visual and olfactory observations recorded. Some indicators of IDs are the presence of excrement, toilet paper, sanitary products or filamentous bacterial growth (Figure 2).

According to the final permit, if flow is observed, a sample must be taken and tested for ammonia, chlorine, and surfactants, at a minimum. If pollutants are above threshold levels, investigations shall continue until the suspected illicit discharge can be isolated to a single pipe run between two manholes. The source of the discharge can be determined by dye testing, smoke testing, pipe videography, or other methods as chosen by the permittee and described in the written system investigation protocol.

Once the source of an ID is identified, removed, and confirmed, the discharge and source location shall be described, and the method of discovery, date of discovery and removal, repair or enforcement action, and estimate of flow volume recorded.

Tips for Detecting Intermittent or Transitory Flows during Outfall Screening (CWP, 2004)

1. Odd hours monitoring—Conduct inspections of manholes/outfalls in Problem or High Risk catchments during evenings and/or weekends.
2. Sandbag dams— During dry weather, place sandbags in pipes and return in 24/48 hours of dry weather to sample any flows captured behind sandbags.
3. Pool sampling—If a plunge pool exists at an outfall, use it as a water sample source.
4. Toxicity monitoring—A perforated plastic bottle containing live minnows is secured within a plunge pool at an outfall. The pool is monitored on a daily basis to track minnow mortality. A sudden die-off may indicate that an illicit discharge has occurred.



Figure 2. White/gray material seen in the pipes is a bacterial plaque often indicative of sanitary sewage.

Based on the final permit, IDs and SSOs should be eliminated as expeditiously as possible (2.3.4.2 and 2.3.4.4).

What are the IDDE Reporting Requirements?

MS4 reporting requirements related to the IDDE program include:

- Dates of ID identification and schedules for removal in the annual report (2.3.4.2);
- Within five days of becoming aware of an SSO, a written notice must be sent to the EPA and MassDEP (2.3.4.4.b-d);
- Status of MS4 mapping (2.3.4.5.e), outfall inventory (2.3.4.7.a), and data collected as part of the dry and wet weather catchment investigations (2.3.4.8.c.iii);

- Dry weather screening and sampling data used in compliance with part 2.3.4.7.b in the annual report (2.3.4.7.b.iv-v);
- Presence or absence of system vulnerability factors (SVFs) for each catchment in the annual report (2.3.4.8.c.i);
- ID confirmed source information such as location, method of discovery, date of elimination or planned corrective measures, and estimated volume of flow removed (2.3.4.8.e.i);
- Evaluation of overall effectiveness of the IDDE Program (2.3.4.9);
- All ongoing screening and sampling results in the annual report (2.3.4.10);
- Frequency and type of employee training in the annual report (2.3.4.11).

What is the Proposed Schedule?

The final permit incorporates new interim milestones to be reached during the permit term (Table 3).

Where Can I go for More Information?

For more information regarding the final permit, go to https://www3.epa.gov/region1/npdes/stormwater/MS4_MA.html.

Center for Watershed Protection (CWP). 2004. *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*, https://www3.epa.gov/npdes/pubs/idde_manualwithappendices.pdf.

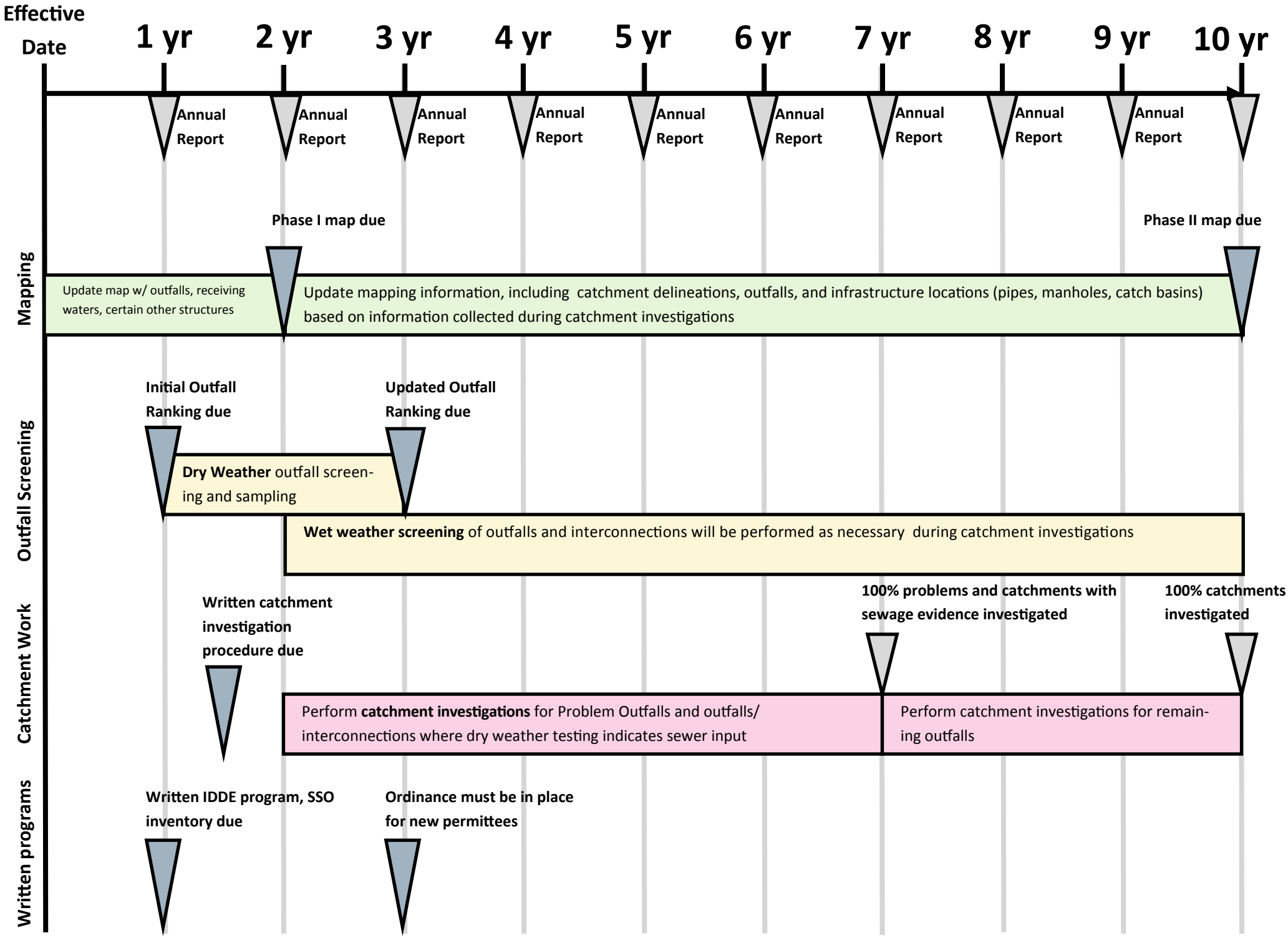
EPA NPDES Training Courses and Webinars on IDDE https://www.epa.gov/npdes/npdes-stormwater-webcasts#municipal.

New England Interstate Water Pollution Control Commission (NEIWPCC). 2003. *Illicit Discharge Detection and Elimination Manual, A Handbook for Municipalities*, www.neiwpcc.org/iddemanual.asp.

Table 3. Key Proposed Deadlines

Final Milestone (MA MS4 General Permit Part)	Deadline (from Effective Date of Permit)						
	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 7	Yr 10
Completion of known SSO inventory (2.3.4.4.b)	X						
Filing of annual report—due 90 days after the close of each reporting period (4.4)	X	X	X	X	X	X	X
• Written IDDE program must be completed (2.3.4.6) • Completed ID assessment and prioritization for all MS4 catchments (2.3.4.7.a) • Development of an outfall and interconnection screening and sampling procedure to be included in the IDDE program (2.3.4.7.b.i) • Submittal of written systematic procedures for investigating each outfall for illicit connections—due 18 months of the permit effective date (2.3.4.8.a)	X						
• Update of MS4 Map with outfalls, receiving waters, open channel conveyances, interconnections, stormwater treatment facilities, impaired waterbodies, and initial catchment delineations (2.3.4.5.a) • Investigations of catchments associated with problem outfalls must begin (2.3.4.8.a)		X					
• For new permittees the ordinance, by-law, or other regulatory mechanism must be in place (2.3.4) • Inspection of all outfalls/interconnections (excluding problem and excluded outfalls) for the presence of dry weather flow (2.3.4.7.b) • Initial priority ranking of outfalls (2.3.4.7.c.iii)			X				
• Investigation of catchments associated with problem outfalls must be completed (2.3.4.8.a) • Investigation of catchments where any information gathered on the outfall identifies sewer input must be completed (2.3.4.8.a)						X	
• Update of MS4 map with outfall spatial locations, pipes, manholes, catch basins, refined catchment delineations, sanitary sewers, and combined sewers (2.3.4.5.b) • Investigation of catchments associated with all problem, high- and low-priority outfalls must be completed (2.3.4.8.a)							X

Additional milestones: within one year of removal of all identified illicit discharges within a catchment area, confirmatory outfall or interconnection screening shall be conducted (2.3.4.8.e.ii). Each outfall or interconnection must be reprioritize for screening and scheduled for ongoing screening once every five years (2.3.4.10).


Effective Date
1 yr
2 yr
3 yr
4 yr
5 yr
6 yr
7 yr
8 yr
9 yr
10 yr
Annual Report
Phase I map due
Phase II map due
Mapping
Update map w/ outfalls, receiving waters, certain other structures
Update mapping information, including catchment delineations, outfalls, and infrastructure locations (pipes, manholes, catch basins) based on information collected during catchment investigations
Initial Outfall Ranking due
Updated Outfall Ranking due
Outfall Screening
Dry Weather outfall screening and sampling
Wet weather screening of outfalls and interconnections will be performed as necessary during catchment investigations
Written catchment investigation procedure due
100% problems and catchments with sewage evidence investigated
100% catchments investigated
Catchment Work
Perform catchment investigations for Problem Outfalls and outfalls/ interconnections where dry weather testing indicates sewer input
Perform catchment investigations for remaining outfalls
Written IDDE program, SSO inventory due
Ordinance must be in place for new permittees
Written programs

Town of Hampden IDDE Program

Appendix C

MassDEP SSO Reporting Instructions and Form

Massachusetts Department of Environmental Protection
Bureau of Water Resources

Wastewater Management Program

Sanitary Sewer Overflow(SSO)/Bypass Notification Form

Who must notify DEP about an overflow or bypass, and when?

Any owner or operator of the following facilities:

- Municipal, state, federal, regional, industrial or other private wastewater collection system;
- Wastewater utility;
- Wastewater treatment works;
- Facility with a groundwater discharge permit;
- Facility with a surface water discharge permit.

This requirement includes any owner or operator of a satellite municipal collection system or other collection system that is part of a larger POTW not under the same ownership and control.

The following situations require notification to DEP and submittal of the SSO Report Form:

- An un-permitted overflow or bypass;
- Backup of wastewater into public or private property when the event is caused by a condition of the system owned and operated by the sewer authority
- In a combined sewer system, an overflow or bypass during dry weather conditions or at a location not covered by a NPDES permit, or from a portion of the system that has a separate sanitary sewer.

Backups of wastewater into a property which are not caused by conditions in the system owned and operated by the sewer system are not required to be reported. These incidents normally occur due to blockages in service connections to a property or blockages in the internal plumbing system.

What are the procedures for reporting?

Step One:

Immediate Telephone and/or email notification to MassDEP, EPA, and other parties:

Notification to MassDEP and other regulatory authorities is a critical element of the SSO response plan. Notification must be made as soon as possible, and no later than 24 hours after discovery of the event. The agency notifications should include all responsible officials whose duties include management of resources which may be affected by the SSO discharge. A list of agencies, contact staff, phone numbers, and emails should be kept by the Sewer Authority and posted for easy access to responsible staff. A list of some relevant agencies follows:

Agency:	Contact	Requirements
MassDEP	During business hours: Northeast Region: (978) 694-3215 Central Region: (508) 792-7650 Southeast Region: (508) 946-2750	Report all SSO events to relevant regional office Report SSO's to emergency line during non-business hours

Sanitary Sewer Overflow(SSO)/Bypass Notification Form

Instructions

	Western Region: (413) 784-1100 24-hour Emergency Line: 1-888-304-1133 If you are not sure which Massachusetts DEP Regional Office oversees your facility, go to http://www.mass.gov/eea/agencies/massdep/about/contacts/.	
EPA	EPA New England: (617) 918-1510 OR Southeast Region: David Turin, (617) 918-1598 Northeast, Central and Western Regions: Douglas Koopman, (617) 918-1747	Report all SSO events
Local Board of Health	List of local BOH contact information available at http://www.mhoa.com/boh-roster/	Report all SSO events to local BOH(s) where impacts may occur
Department of Conservation and Recreation	State House Ranger Base 617-722-1188	Where DCR beaches or parks affected
MA Division of Marine Fisheries	Boston/Northeast: 617-727-3336 x 165 Southeast: 508-563-1779 x 122	Where shellfish resources may be affected
Drinking Water Resource Managers	List of Drinking Water Supply contacts available at http://www.mass.gov/eea/docs/dep/about/organization/pwscont.pdf	Where Drinking Water Resources may be affected

Hazardous Material Releases: If you believe an overflow, bypass, or any other discharge may have resulted in an oil or hazardous material release, report it to DEP at any time, 24 hours a day, at this toll free number: 1-888-304-1133.

MassDEP may require, on a case-by-case basis, more extensive reporting of the SSO event where determined necessary to protect users of resources affected by SSO discharges.

Step Two:
Submit a written report to DEP within five (5) calendar days of the time you become aware of the overflow, bypass or backup. DEP requires the use of the MassDEP Sanitary Sewer Overflow (SSO)/Bypass notification form, unless an alternative reporting form is authorized by MassDEP in writing.

Massachusetts Department of Environmental Protection
Bureau of Water Resources – Wastewater Management Program

Sanitary Sewer Overflow(SSO)/Bypass Notification Form

Instructions

The Notification form should be fully completed, and shall include a clear description of the overflow, or bypass and its causes, including the best approximation of the dates and times, and if the situation has not been corrected, the amount of time the overflow/bypass is expected to continue, and a description of the measures to be implemented to stop the discharge. The Form or attachments must also include steps taken or planned to reduce, eliminate, and prevent recurrence.

If you have a discharge permit, check the Monitoring and Reporting Section of your permit to determine if your *Notification Form* should be sent to the attention of DEP's regional Bureau of Waste Prevention (industrial facilities) or the regional Bureau of Water Resources (nonindustrial facilities). All municipal facilities shall submit their reports to the Bureau of Water Resources.

Fax the *Notification Form* to the attention of the Bureau of Water Resources in your DEP regional office and to the appropriate EPA personnel depending on your DEP region:

- Massachusetts Department of Environmental Protection, Northeast Regional Office, 205B Lowell Street, Wilmington, MA 01887. Fax: 978-694-3499.
- Massachusetts Department of Environmental Protection, Central Regional Office, 8 New Bond Street, Worcester, MA 01606. Fax: 508-792-7621.
- Massachusetts Department of Environmental Protection, Southeast Regional Office, 20 Riverside Drive, Lakeville, MA 02347. Fax: 508-947-6557.
- Massachusetts Department of Environmental Protection, Western Regional Office, 436 Dwight Street, Springfield, MA 01103. Fax: 413-784-1149.
- U.S. Environmental Protection Agency, Water Technical Unit (OES 04-4), 5 Post Office Square – Suite 100, Boston, MA 02109-3912
    - Southeast Region: David Turin, Fax 617-918-0598
    - Northeast, Central and Western Regions: Douglas Koopman, Fax (617) 918-0747

What should I do if I'm not sure of the information I am providing?
For required items such as time of occurrence, causes of incident, volume of overflow, etc., PROVIDE YOUR BEST ESTIMATE OR ASSESSMENT AT THE TIME OF THIS REPORT. You can submit any additions or corrections later.

What is the best way to report the exact location of the overflow, or bypass?
Include with your *Notification Form* a copy of a map indicating its location. Please use 8 ½ " by 11" paper at an appropriate scale between 1:5000 to 1:25000. Specifying the geographic location will help DEP determine the public health and water quality impacts associated with overflows and bypasses.

Why do I need to report backups into buildings?
DEP wants to ensure that sewage backups into buildings as a result of problems in the sewer system are properly repaired and measures are put in place to reduce the likelihood of recurrence. Owner/operators of sewer systems that caused a backup may need to repair, rehabilitate, or upgrade the hydraulic capacity of their system, or change their operations and maintenance procedures.

Are there some overflows or Bypass that are not subject to these reporting requirements?
DO NOT use the *Sanitary Sewer Overflow(SSO)/Bypass Notification* Form in the following situations:

Sanitary Sewer Overflow(SSO)/Bypass Notification Form

Instructions

- The overflow is from a properly permitted Combined Sewer Overflow structure. Follow the reporting requirements in your NPDES Permit.

- You are reporting an overflow or bypass of sewage for a collection system or treatment works that is not under your ownership and control. However, please assist DEP by immediately reporting to the appropriate DEP Regional Office by phone or fax any overflows or bypass incidences for facilities other than your own which involve a discharge of wastewater to the environment.

What are the state regulations that apply to this notification? Where can I get copies?

These regulations include, but are not limited to:

- Surface Water Discharge Regulations, 314 CMR 3.00
- Groundwater Discharge Regulations, 314 CMR 5.00
- Sewer Connection Regulations, 314 CMR 7.00
- Operation and Maintenance Regulations, 314 CMR 12.00

Official copies of the regulations may be purchased at:

State Bookstore
State House, Room 116
Boston, MA 02133
617-727-2834

State Bookstore
436 Dwight Street
Springfield, MA 01103
413-784-1376

Massachusetts Department of Environmental Protection
Bureau of Water Protection – Wastewater Management Program

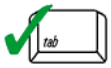
Sanitary Sewer Overflow (SSO)/Bypass Notification Form

FOR DEP USE ONLY

Tax Identification Number

A. Reporting Facility

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.





1. Facility Information

Reporting Sewer Authority _____ Permit # _____

2. Authorized Representative Transmitting Form:

First Name _____ Last Name _____ Telephone No. _____

Title _____ E-mail Address _____

B. Phone Notifications:

See DEP Regional Office telephone and fax numbers at the end of this form.

1. **MassDEP staff** contacted: first name _____ last name _____

   Date/Time contacted: Date _____ Time _____ ☐ am ☐ pm

2. **EPA staff** contacted: first name _____ last name _____

   Date/Time EPA contacted: Date _____ Time _____ ☐ am ☐ pm

3. Board of Health contacted: First Name _____ Last Name _____

   Date/Time contacted: Date _____ Time _____ ☐ am ☐ pm

4. Others notified (select all that apply); ☐ Conservation Commission

   ☐ Harbormaster ☐ Shellfish Warden ☐ Division of Marine Fisheries

   ☐ Downstream Drinking Water Supplier ☐ Watershed Association

   ☐ Beach Resource Manager ☐ Other: _____ (specify)

C. SSO Information

1. SSO Discovered: Date _____ Time _____ ☐ am ☐ pm

   By: _____

2. SSO Stopped: Date _____ Time _____ ☐ am ☐ pm

3. SSO Discharge from: ☐ Sanitary Sewer Manhole ☐ Pump Station

   ☐ Backup into Property ☐ Other: _____ (specify)

4. SSO Discharge to: ☐ Ground Surface (no release to surface water)

   ☐ Direct to Receiving Water _____ (surface water)

   ☐ Catch basin to Receiving Water _____ (surface water)

   ☐ Backup into Property Basement

Massachusetts Department of Environmental Protection
Bureau of Water Protection – Wastewater Management Program

Sanitary Sewer Overflow (SSO)/Bypass Notification Form

FOR DEP USE ONLY

Tax Identification Number

C. SSO Information (cont.)

Location: _____
(Description of discharge site or closest address)

5. Estimated SSO Volume at time of this Report: _____

   Method of Estimating Volume: _____

6. Cause of SSO Event:

   ☐ Rain Event ☐ Pump Station Failure ☐ Insufficient Capacity in System

   ☐ Treatment Unit failure

   ☐ Sewer System Blockage: ☐ Pipe Collapse ☐ Root Intrusion ☐ Grease Blockage

   ☐ Other: _____
   (Specify)

7. Corrective Actions Taken:

   _____

   _____

   _____

   _____

   Impact Area cleaned and/or disinfected: ☐ Yes ☐ No

   _____

   _____

   Corrective Actions Completed: ☐ Yes ☐ No

   _____

D. Comments/Attachments/Follow-up

I wish to provide (select all that apply):

☐ Attachment ☐ Additional comments below: ☐ No additional comments or attachments

Additional comments and planned actions:

_____

_____

_____

Massachusetts Department of Environmental Protection
Bureau of Water Protection – Wastewater Management Program

Sanitary Sewer Overflow (SSO)/Bypass Notification Form

FOR DEP USE ONLY

Tax Identification Number

E. Certification Statement

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, 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.

Signature of Authorized Representative

Date Signed

Please keep a copy of this report for your records. When submitting additional information, include the MassDEP Incident Number from this report.

MassDEP Regional Office and EPA Telephone and Fax Numbers:

Northeast Region	Phone: 978-694-3215	Fax: 978-694-3499
Southeast Region	Phone: 508-946-2750	Fax: 508-947-6557
Central Region	Phone: 508-792-7650	Fax: 508-792-7621
Western Region	Phone: 413-784-1100	Fax: 413-784-1149
EPA	Phone: 617-918-1510	
EPA for Southeast Region, David Turin	Phone: 617-918-1598	Fax: 617-918-0598
EPA for Northeast, Central and Western Regions, Douglas Koopman	Phone: 617-918-1747	Fax: 617-918-0747
DEP 24-hour emergency	Phone: 888-304-1133	

Town of Hampden IDDE Program

Appendix D

Preliminary Outfall Inventory, Outfall and Catchment Ranking, and Map

Town of Hampden MS4 Outfall and Interconnection Inventory, Initial Ranking, and Initial Catchment Delineations

TO: Hampden Stormwater Committee

FROM: Tracy J. Adamski, AICP, Tighe & Bond

DATE: June 27, 2019

Tighe & Bond has completed the **Town of Hampden's** initial outfall and interconnection inventory and ranking in accordance with Part 2.3.4.5 and 2.3.4.7 of the U.S. Environmental EPA's National Pollutant Discharge Elimination System (NPDES) General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) in Massachusetts, effective July 1, 2018 (Small MS4 General Permit). The initial inventory and ranking determine the priority screening order for all outfalls and interconnections in accordance with Part 2.3.4.7.b of the Small MS4 General Permit and catchment investigations for evidence of illicit discharges and SSOs in accordance with Part 2.3.4.8 of the Small MS4 General Permit.

This memorandum and associated summary tables and map satisfy EPA's requirement to include initial catchment delineations on the Phase I system map (due within two years of the permit effective date) and to priority rank each outfall based on illicit discharge potential (due within one year of the permit effective date). The inventory and delineations will be updated as the Illicit Discharge Detection and Elimination (IDDE) Program is implemented and updates will be included in subsequent Annual Reports.

1. Outfall Inventory and Priority Ranking

Tighe & Bond followed EPA's ranking process outlined in Part 2.3.4.7.a of the Small MS4 General Permit for each of the known outfalls and interconnections in town. Based on the outfall ranking category definitions in Part 2.3.4.7.a.ii, outfalls were ranked into one of the four categories: Problem, High Priority, Low Priority, and Excluded outfalls. Descriptions of these categories can be found in Section 6 of the Town's IDDE Plan. At this time, there are no known interconnections. As of June 2019, the Town's stormwater GIS indicates that there are **68** outfalls that fall inside the MS4 urbanized area and are regulated by the 2016 Small MS4 General Permit.

During the initial desktop screening, Tighe & Bond concluded that none of the known outfalls should be ranked as a Problem outfall because no known historic illicit connection or discharge problem areas existed within the Town. Additionally, none of the outfalls were classified as Excluded outfalls since all outfalls, at this time, have the *potential* for an illicit discharge. For this reason, each outfall was assigned either a Low or High Priority during the initial ranking.

The following criteria were used to classify the Town's MS4-regulated outfalls as High or Low Priority. Outfalls were classified as High Priority if they exhibited one or more of the determination factors described below. Outfalls that did not exhibit any of the determination factors were categorized as Low Priority. The attached Preliminary Outfall and Catchments Ranking map illustrates where these areas of concern are within Hampden's regulated area and in relation to each outfall.

Proximity to Zone I and Zone II Wellhead Protection Areas

Outfalls are located within a Zone I or Zone II MassDEP Wellhead Protection Area (WHPA) were considered High Priority due to potential public health implications in the event of an illicit discharge. In Hampden, 1 of the outfalls fell within a Zone I WHPA and was therefore designated as a High Priority outfall.

Proximity to Dense Development

Based on discussion with the Town, outfalls discharging in areas of dense residential development, particularly near water bodies, were also ranked as High Priority for the greater potential to create illicit discharges. Within Hampden, the Raymond Drive subdivision near the Great Horse Golf Course was identified as a relatively dense development adjacent to waterbodies, and the associated 2 outfalls were therefore considered as High Priority.

Areas with Historic High Groundwater

The Sessions Drive/Baldwin Drive/Fernwood Drive/Crestwood Lane, Genevieve Drive/Erica Circle, and Martin Farms Road areas of Town are known for historically high groundwater table. The 8 outfalls within these areas are designated as High Priority outfalls due to historic problems with septic system functionality and pollution prevention concerns.

Proximity to Impaired Waters

All outfalls within 500 feet of an impaired waterbody (with a pollutant of concern associated with stormwater) were considered high priority. Although the Massachusetts Year 2014 Integrated List of Waters does not list any waters located within Hampden as impaired, the draft Massachusetts Year 2016 Integrated List of Waters lists the Scantic River (segment MA34-30, 9.6 miles in length from the Massachusetts/Connecticut border in Monson to the Massachusetts/Connecticut border in Hampden) as a Category 5 water requiring a Total Maximum Daily Load (TMDL) for an *Escherichia coli* impairment. As such, 3 outfalls within 500 feet of the Scantic River were considered High Priority.

Summary

Based on the screening procedure described in Section 1 of this memorandum, the Town of Hampden's initial outfall and interconnection inventory includes **14 High Priority outfalls** and **54 Low Priority outfalls**.

2. Initial Catchment Delineation

Initial catchment delineations and rankings were completed based on the Metropolitan Area Planning Council's GIS-Based Catchment Delineation and Ranking Methodology available through the Neponset Stormwater Partnership.[1] Slight modifications to MAPC's delineation process were made to produce more accurate catchments by accounting for the town specific terrain. These modifications included burning in polygon water features at -2.0 meters, polyline water features at -1.0 meters, right-of-way polylines at -1.0 meters and only class 4 road centerlines at 0.5 meters. Catch basins were snapped at 15 feet instead of the default 5 feet. Tighe & Bond was not able to delineate each of the outfalls where Hampden's stormwater GIS lacked connectivity because using topography alone may not represent the drainage area contributing to an outfall.

This delineation produced **35 initial catchment delineations** for outfalls within the regulated area. As Hampden's stormwater mapping and connectivity is updated during implementation of the IDDE Program, the catchments can be further refined.

[1] MAPC. February 2015. *Neponset Outfall Catchment Analysis*. https://github.com/MAPC/stormwater-toolkit

A priority ranking was assigned to each delineated catchment based on the ranking of the associated outfall. For example, if an outfall was considered a High Priority because of proximity to the Scantic River, the associated catchment would also be ranked as a High Priority catchment. For catchments with multiple outfalls, the catchment was ranked based on the outfall with the highest rank (i.e., if one outfall was ranked Low Priority and one outfall was ranked High Priority, the catchment was assigned a rank of High Priority). The initial catchment delineations and rankings are shown on the Preliminary Outfall and Catchments Ranking map.

Summary

Based on the screening procedure described in Section 2 of this memorandum, the Town of Hampden's initial catchment inventory includes **10 High Priority catchments** and **25 Low Priority catchments**. Thirty-three (33) outfalls do not have a separate associated catchment area delineated as of the date of this memorandum and will need to be further refined as stormwater mapping is improved.

Attachments

Outfall and Interconnection Inventory and Initial Ranking Table

Preliminary Outfall and Catchments Ranking map

J:\H\H1436 Hampden\011 - MS4 Year 1 NOI & GIS\Report_Evaluation\Written IDDE Plan\App D Drainage Map, OF Inventory, Catchment Delineations\Hampden Outfall Prioritization Memo.docx

Town of Hampden Preliminary Outfall Inventory

Outfall ID	Diameter (inches)	Material	Condition	Receiving Water	Location Description	Notes
1_OF	12	Steel	Poor	Outside Receiving	Allen St.- Across from Mt. View	Broken at end
2_OF	18	RCP	Good	Watchaug Brook	Allen St.- Opposite near Pinewood	
3_OF	30	RCP	Good	Wetland to Tributary to Watchaug Brook	Allen St. Opposite Stony Hill	
4_OF	18	RCP	Good	Isolated Wetland off of Andrew Circle	Andrew Circle - At End	
5_OF	20	RCP	Good	Isolated Wetland off of Andrew Circle	Andrew Circle - Mid Way	
6_OF	15	RCP	Good	Wetland to Mill Pond	Bayberry Road- Northwest bend	
7_OF	15	Steel	Good	Outside Receiving	Brookside Drive- Mid way	
8_OF	12	RCP		Isolated Wetland off of Circle View Drive	Circle View Drive - Southern end	Not located but line appears to go out toward wetland
9_OF	8	Steel	Good	Wetland to Tributary to South Branch Mill River	Circle View Drive - Northern end	
10_OF	15	Plastic		Outside Receiving	Colony Drive - Mid	Not located property owner did not want us looking
11_OF	15	RCP	Good	Outside Receiving	Colony Drive - North end	
12_OF	12	Steel	Good	Outside Receiving	Crestwood Lane - Midway	
13_OF	18	Plastic	Good	Tributary to South Branch Mill River	Echo Valley Drive - 2/3 South side	
14_OF	20	RCP	Fair	Tributary to Wetland to Scantic River	Erica Circle - First bend	
15_OF	18	RCP		Outside Receiving	Evergreen Terrace - At bend	
16_OF	8	RCP	Fair	Wetland to Tributary to South Branch Mill River	Fernwood Drive - Southern end	Slightly broken still functional
17_OF	12	Steel	Fair	Wetland to Tributary to South Branch Mill River	Fernwood Drive - Mid way	Bottom split but appears to be working
18_OF	12	Steel		Wetland to Tributary to South Branch Mill River	Fernwood Drive - Northern end	Underwater difficult to assess
19_OF	18	RCP	Good	Tributary to Wetland to Scantic River	Fox Run Lane - Mid way	
20_OF	12	Plastic		Tributary to Wetland to Scantic River	Martin Farm Road - Mid way	
21_OF	30	RCP		Wetland to Scantic River	Mill Road-South side of bridge	Ground appears to be filled with wood chips. No outfall observed
22_OF	12	RCP		Wetland to Tributary to South Branch Mill River	Oak Knoll Dr- North off End	Outfall not seen but line leads back toward wetland in back
23_OF	12	Metal		Wetland to Tributary to Watchaug Brook	Old Orchard - South of beginning	
24_OF	15	RCP		Tributary to Wetland to Watchaug Brook	Old Orchard - South west bend	
25_OF	12	Metal		Tributary to Wetland to Scantic River	Potash Hill Lane - At End	
26_OF	12	Clay		Scantic River	River Park Drive - South off end	Not found. Appears to direct connect to Scantic River
27_OF	14	Asph. Coat		Outside Receiving	Samble Lane - West off bend	
28_OF	12	Metal	Poor	Outside Receiving	Sessions Drive - South off	Damaged at end.
29_OF	18	RCP	Good	Tributary to Wetland to South Branch Mill River	Stony Hill Road - East off Southern end	
30_OF	36	Steel		Wetland to Tributary to Watchaug Brook	GreatHorse - Northern most pond	
74_OF				Isolated Wetland off of Stony Hill Road	Location assumed in wetland. Visible line in CB in this direction	Outfall not located. Assumed to cross road at CB-A and enter wetland .
75_OF				Outside Receiving		Outfall not located. Does not seem to be accurate
76_OF				Wetland to South Branch Mill River		Likely not existent. No catch basin in area
77_OF				South Branch Mill River	At catch basin	Direct drop. Drain into brook below road
78_OF	12	Metal		Outside Receiving	5 ft off road	Mostly buried
79_OF	8	Plastic	Good	Wetland to South Branch Mill River	100 ft off road between property lines	8 ΓÇ£ plastic. Good condition
80_OF	12	Metal	Good	Outside Receiving	15 ft off road	12" Metal corrugated. Good condition
81_OF	6	Plastic	Good	Outside Receiving	25 ft off road	6" plastic. Good condition. Mostly buried line
82_OF		Metal	Fair	Outside Receiving	Channel off road	
83_OF		Metal	Fair	Tributary to South Branch Mill River	Off road. Small channel	No water current
84_OF		Plastic	Good	Tributary to South Branch Mill River	Off road used for brook channel	
87_OF		RCP	Good	Tributary to South Branch Mill River	Off road creating stream channel. May be part of small intermittent stream	
88_OF	16	Metal	Good	Tributary to Sawmill Brook	Off road forming channel	Rocks on top
89_OF	24	RCP	Good	Outside Receiving	Off road forming channel	Rocks on top
91_OF				Tributary to Watchaug Brook		Submerged cannot properly identify
92_OF	12			Outside Receiving		Inlet crosses road to outlet
93_OF	24	RCP		Tributary to Wetland to Watchaug Brook	Back of school in woods behind	24" concrete. Good condition
94_OF				Outside Receiving		
95_OF				Outside Receiving		
96_OF	24	Plastic		Outside Receiving	25 ft off road	Each runs from individual Catchbasin (not connected)
97_OF	24	Metal		Outside Receiving	35 ft off road	
98_OF	12	RCP	Good	Scantic River	Far back property near river	
99_OF	18	RCP	Good	Tributary to Wetland to Scantic River	30 ft off road	
103_OF				Outside Receiving		
104_OF	12	RCP	Good	Isolated Wetland off of Genevieve Drive	12ft off road	
105_OF	16	RCP	Good	Tributary to Wetland to Scantic River	25 ft off road	
106_OF				Wetland to Scantic River		
107_OF				Wetland to Tributary to Watchaug Brook		Appears to be correct. Couldn't locate
108_OF				Tributary to Wetland to Scantic River	Could not find	Location appears to be accurate based on stagnant water and wetland veg.
109_OF	4	PVC		Wetland to Tributary to Scantic River	Right off driveway	May just be for surface runoff
110_OF				Outside Receiving		
120_OF	12	Metal	Good	Tributary to South Branch Mill River	Off road carries to brook	
121_OF				Tributary to South Branch Mill River	Brook no storm outfall observed	Brook crossing. Drainage outfall not observed nearby catchbasins assume
122_OF				Outside Receiving	7 ft off road. Connects to CB-D	Appears to be new
123_OF				Outside Receiving		
124_OF				Outside Receiving	15 ft off road	
125_OF			Good	Tributary to Scantic River	Near bridge off road 10 ft	May be outfall for nearby filled outfall.
126_OF				Scantic River		

Town of Hampden Preliminary Outfall Ranking

Outfall ID	Preliminary Outfall Rank	Within Zone I WHPA	Discharges to Impaired Water*	Proximity to Dense Development	Proximity to Areas with Historic High Groundwater	Receiving Waterbody
1 OF	High	Yes				Outside Receiving
2 OF	Low					Watchaug Brook
3 OF	Low					Wetland to Tributary to Watchaug Brook
4 OF	Low					Isolated Wetland off of Andrew Circle
5 OF	Low					Isolated Wetland off of Andrew Circle
6 OF	Low					Wetland to Mill Pond
7 OF	Low					Outside Receiving
8 OF	Low					Isolated Wetland off of Circle View Drive
9 OF	Low					Wetland to Tributary to South Branch Mill River
10 OF	Low					Outside Receiving
11 OF	Low					Outside Receiving
12 OF	High				Yes, Crestwood Drive	Outside Receiving
13 OF	Low					Tributary to South Branch Mill River
14 OF	High				Yes, Erica Circle	Tributary to Wetland to Scantic River
15 OF	Low					Outside Receiving
16 OF	High				Yes, Fernwood Drive	Wetland to Tributary to South Branch Mill River
17 OF	High				Yes, Fernwood Drive	Wetland to Tributary to South Branch Mill River
18 OF	High				Yes, Fernwood Drive	Wetland to Tributary to South Branch Mill River
19 OF	Low					Tributary to Wetland to Scantic River
20 OF	High				Yes, Martin Farms Road	Tributary to Wetland to Scantic River
21 OF	Low					Wetland to Scantic River
22 OF	Low					Wetland to Tributary to South Branch Mill River
23 OF	Low					Wetland to Tributary to Watchaug Brook
24 OF	Low					Tributary to Wetland to Watchaug Brook
25 OF	Low					Tributary to Wetland to Scantic River
26 OF	High		Yes			Scantic River
27 OF	Low					Outside Receiving
28 OF	High				Yes, Session Drive	Outside Receiving
29 OF	Low					Tributary to Wetland to South Branch Mill River
30 OF	Low					Wetland to Tributary to Watchaug Brook
74 OF	Low					Isolated Wetland off of Stony Hill Road
75 OF	Low					Outside Receiving
76 OF	Low					Wetland to South Branch Mill River
77 OF	Low					South Branch Mill River
78 OF	Low					Outside Receiving
79 OF	Low					Wetland to South Branch Mill River
80 OF	Low					Outside Receiving
81 OF	Low					Outside Receiving
82 OF	Low					Outside Receiving
83 OF	Low					Tributary to South Branch Mill River
84 OF	Low					Tributary to South Branch Mill River
87 OF	Low					Tributary to South Branch Mill River
88 OF	Low					Tributary to Sawmill Brook
89 OF	Low					Outside Receiving
91 OF	High			Yes, Raymond Drive		Tributary to Watchaug Brook
92 OF	High			Yes, Raymond Drive		Outside Receiving
93 OF	Low					Tributary to Wetland to Watchaug Brook

Town of Hampden Preliminary Outfall Ranking

Outfall ID	Preliminary Outfall Rank	Within Zone I WHPA	Discharges to Impaired Water*	Proximity to Dense Development	Proximity to Areas with Historic High Groundwater	Receiving Waterbody
94 OF	Low					Outside Receiving
95 OF	Low					Outside Receiving
96 OF	Low					Outside Receiving
97 OF	Low					Outside Receiving
98 OF	High		Yes			Scantic River
99 OF	Low					Tributary to Wetland to Scantic River
103 OF	Low					Outside Receiving
104 OF	High				Yes, Genevieve Drive	Isolated Wetland off of Genevieve Drive
105 OF	Low					Tributary to Wetland to Scantic River
106 OF	Low					Wetland to Scantic River
107 OF	Low					Wetland to Tributary to Watchaug Brook
108 OF	Low					Tributary to Wetland to Scantic River
109 OF	Low					Wetland to Tributary to Scantic River
110 OF	Low					Outside Receiving
120 OF	Low					Tributary to South Branch Mill River
121 OF	Low					Tributary to South Branch Mill River
122 OF	Low					Outside Receiving
123 OF	Low					Outside Receiving
124 OF	Low					Outside Receiving
125 OF	Low					Tributary to Scantic River
126 OF	High		Yes			Scantic River

* The Scantic River segment within the Town of Hampden is listed as a Category 5 water impaired by *E. coli* in the draft Massachusetts Year 2016 Integrated List of Waters, but is not listed as impaired in the final Massachusetts Year 2014 Integrated List of Waters

Town of Hampden Preliminary Catchment Ranking

Catchment ID	Outfall ID	Preliminary Catchment Rank	Receiving Waterbody
1_OF	1_OF	High	Outside Receiving
2_OF	2_OF	Low	Watchaug Brook
3_OF	3_OF	Low	Wetland to Tributary to Watchaug Brook
6_OF	6_OF	Low	Wetland to Mill Pond
7_OF	7_OF	Low	Outside Receiving
8_OF	8_OF	Low	Isolated Wetland off of Circle View Drive
9_OF	9_OF	Low	Wetland to Tributary to South Branch Mill River
10_OF	10_OF	Low	Outside Receiving
11_OF	11_OF	Low	Outside Receiving
12_OF	12_OF	High	Outside Receiving
16_OF	16_OF	High	Wetland to Tributary to South Branch Mill River
17_OF	17_OF	High	Wetland to Tributary to South Branch Mill River
18_OF	18_OF	High	Wetland to Tributary to South Branch Mill River
19_OF	19_OF	High	Tributary to Wetland to Scantic River
20_OF	20_OF	High	Tributary to Wetland to Scantic River
22_OF	22_OF	Low	Wetland to Tributary to South Branch Mill River
23_OF	23_OF	Low	Wetland to Tributary to Watchaug Brook
24_OF	24_OF	Low	Tributary to Wetland to Watchaug Brook
25_OF	25_OF	Low	Tributary to Wetland to Scantic River
26_OF	26_OF	High	Scantic River
28_OF	28_OF	High	Outside Receiving
29_OF	29_OF	Low	Tributary to Wetland to South Branch Mill River
75_OF	75_OF	Low	Outside Receiving
80_OF	80_OF	Low	Outside Receiving
83_OF	83_OF	Low	Tributary to South Branch Mill River
94_OF	94_OF	Low	Outside Receiving
95_OF	95_OF	Low	Outside Receiving
99_OF	99_OF	Low	Tributary to Wetland to Scantic River
103_OF	103_OF	Low	Outside Receiving
104_OF	104_OF	High	Isolated Wetland off of Genevieve Drive
106_OF	106_OF	Low	Wetland to Scantic River
107_OF	107_OF	Low	Wetland to Tributary to Watchaug Brook
108_OF	108_OF	Low	Tributary to Wetland to Scantic River
109_OF	109_OF	Low	Wetland to Tributary to Scantic River
110_OF	110_OF	Low	Outside Receiving

SPRINGFIELD

WILBRAHAM

MONSON

EAST LONGMEADOW

SOMERS, CT

STAFFORD, CT

PRELIMINARY OUTFALL AND CATCHMENTS RANKING

LEGEND

Outfall

Preliminary Rank

- High
- Low

Catchment

Preliminary Rank

- High
- Low
- Major Road - Collector
- Minor Street or Road
- Stream/Intermittent Stream
- NWI Rivers and Streams
- DEP Approved Wellhead Protection Area (Zone I)
- Public Surface Water Supply (PSWS)
- Water Bodies
- Inland Wetlands
- Town Boundary

LOCUS MAP



N W E S

0 3,300
Feet

1:19,800

NOTES

1. Based on USGS Topo Map (1987)
2. MassGIS: Community Boundary (2017), National Wetlands Inventory (2007), MassDOT Major Roads (2014)
3. Town of Hampden: Outfalls

Illicit Discharge Detection and Elimination Plan
Hampden, Massachusetts

June 2019

Tighe&Bond
Engineers | Environmental Specialists

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Town of Hampden IDDE Program

Appendix E

Protocol for IDDE Program Responsibilities

TOWN OF HAMPDEN
IDDE PROGRAM RESPONSIBILITIES PROTOCOL

This document establishes a written protocol that clearly identifies responsibilities with regard to eliminating illicit discharges, including:

1. Identification of a suspected illicit discharge to Hampden's MS4
2. Contact information to report suspected illicit discharges
3. Responsibility for elimination of identified illicit discharges
4. Standard operating procedures (SOPs) for enforcement and elimination of the illicit connection or identified problem
5. Process for documentation and verification of removal of the connection or the discharge.

1. IDENTIFICATION OF A SUSPECTED ILLICIT DISCHARGE TO HAMPDEN'S MS4

There are a variety of ways that an illicit discharge to the MS4 might be discovered and reported to the Town.

- **Residents and Businesses of Hampden.** Through the Town's public education and outreach efforts, residents and businesses of Hampden are becoming more aware that the municipal storm drain drains directly into Hampden's water bodies. The public may report illicit connections or illegal dumping to the Fire Department, Board of Health, Highway Department, or Conservation Commission.
- **Maintenance Field Crews.** Municipal staff and contractors that conduct Hampden's drainage and roadway operation and maintenance activities are some of the observers available for detection of illicit discharges and illegal dumping activities.
- **Inspectors.** Both municipal staff and private inspectors may conduct inspections of construction sites, buildings, and other operations and maintenance on public or private properties.
- **Personnel Conducting Outfall and Stream Monitoring**. Through the Town's outfall monitoring program, pollutant concentrations may indicate the presence of an illicit discharge. In this case, a follow up investigation may be necessary to identify the source of the contamination.

As part of the Town's public education and outreach and employee training programs, the Town should encourage people involved in these activities to report any signs of illegal dumping or a suspected illicit discharge. It is important that the information observed in the field is communicated to the appropriate staff for follow up and outreach.

2. CONTACT INFORMATION TO REPORT SUSPECTED ILLICIT DISCHARGES

The following contact information should be advertised on any educational materials regarding illicit discharges and illegal dumping, as well as on the Town website.

- **For Imminent Emergency Situations where there is an immediate risk to public health and safety: Call 911**
- For **Urgent Situations**, where public health, safety, and/or the environment are at risk and there are possibly hazardous chemicals, tell your Foreman or call the Fire Department's non-emergency line at (413) 566-3314.
- For **Non-Emergency Situations**: tell your Foreman or call the Highway Department at (413) 566-8842.
- **When in doubt, call 911**.

3. RESPONSIBILITY FOR ELIMINATION OF IDENTIFIED ILLICIT DISCHARGES

This section defines the parties responsible for eliminating reported illicit discharges under three scenarios.

Imminent Emergency Situations

Take **immediate action** in the event of encountering one of the following situations:

- Individuals actively in the process of introducing possible illegal substances or materials into the MS4
- Presence of fumes or smoke emanating from the MS4
- Visible significant stream of a controlled chemical or petroleum product flowing in the storm drain system or in downstream waters
- Large chemical plume in stream or river downstream of a Town outfall
- Any condition that poses or could pose an immediate threat to property, human health or safety, or aquatic life.

If one of the above situations is encountered, take the following steps:

1. Ensure safety of municipal employees and/or the public by instructing the people to stay away from the area
2. **Call 911** to report active illegal dumping or potential fire or significant chemical incident that has the potential to be hazardous to public health or the environment.
3. Be prepared to provide the following information to the Fire Department or other Emergency Responders:
   - Where is the emergency or spill?
   - What is the emergency or what spilled?
   - How much spilled?
   - Who spilled the material?
   - Is anyone cleaning up the material?
   - Are there resource damages (such as dead fish or oily birds)?
   - Who is reporting the emergency and/or spill?
   - Your contact information
4. Take detailed notes and photos for subsequent investigation by the Town or other agencies.

911 will receive the call and dispatch the Fire and/or Police Department. Fire and Police may coordinate with other Town Departments and Boards such as the Highway Department, Board of Health, Board of Selectmen, or Conservation Commission, as necessary.

Urgent Situations

Take **immediate action** in the event of encountering one of the following situations:

- Very strong chemical odor emanating from the MS4
- Suspicion of hazardous chemicals in the MS4
- Public health and safety or the environment may be urgently at risk.

If one of the above situations is encountered, take the following steps:

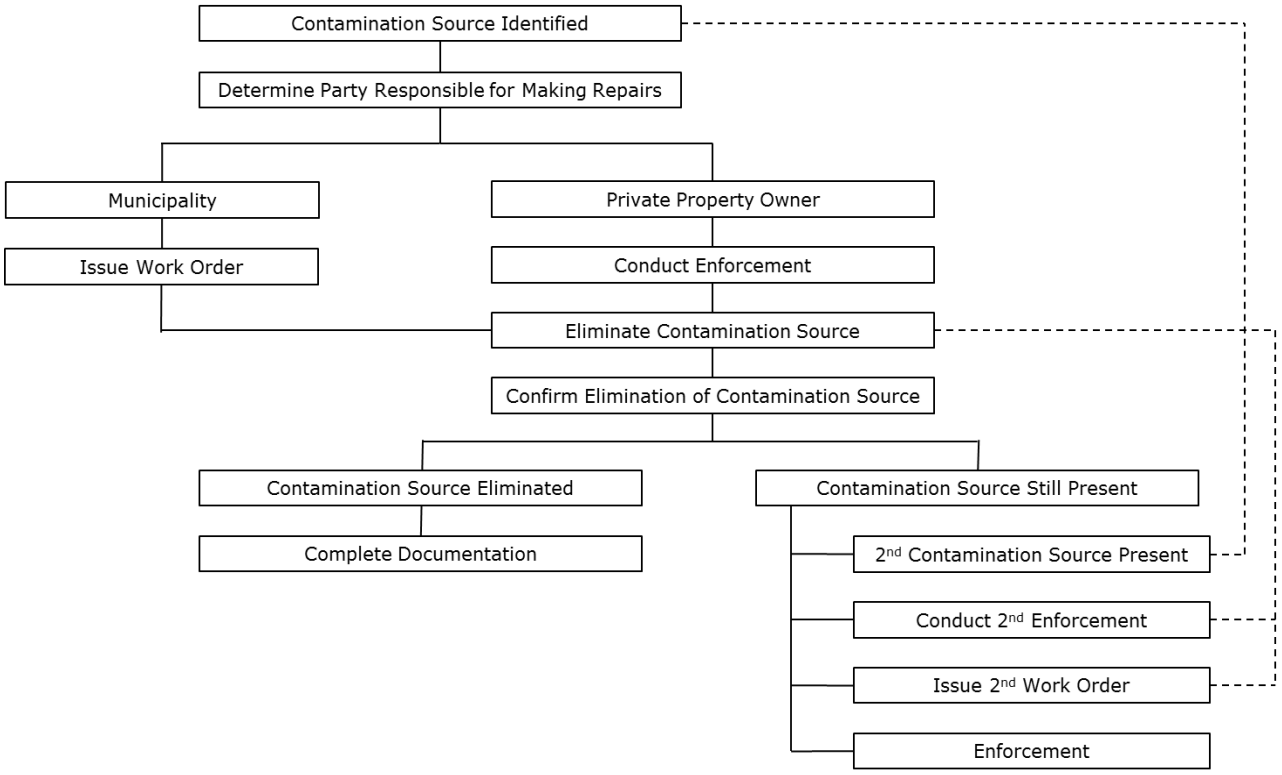
1. Call the Fire Department's non-emergency line and report the situation to the Officer in Charge.
2. Be prepared tell the Fire Department or other Emergency Responders what the situation is, where the illicit discharge is, and any other information about the situation. Take notes and photographs for subsequent investigation by the Town or other agencies.

The Fire Department will respond to the situation and follow its Emergency Response Procedures and its Spill Response Procedures, and may coordinate as necessary with other Town Boards and Departments. Records of illicit discharges should be forwarded to the Highway Department.

Non-Emergency Situations

If a non-emergency situation is encountered, notify your Foreman or call the Highway Department or the Fire Department's non-emergency line. The Fire Department or Highway Department will report the situation to the Board of Health and may coordinate with other applicable Town Departments and Boards such as the Planning Board, Board of Selectmen, or Conservation Commission.

Once the report is received, Town staff may follow the Flow Chart for Non-Emergency Corrective Actions presented below.



4. ILLICIT DISCHARGES ENFORCEMENT SOP

The following SOP has been developed from requirements of Chapter XIV of the Hampden General Bylaws (*Stormwater Management Bylaw*).

When the Board of Selectmen or an authorized agent of the Board of Selectmen is notified of or discovers an illicit discharge, illicit connection, or obstruction of the municipal drain system that is the responsibility of an entity other than the Town (i.e., located on or emanating from non-municipally-owned property), it should use the following SOP, with adjustments as appropriate for the specific circumstances of each enforcement action. For simplicity, this SOP assumes that the property owner is the violator; make the necessary adjustments if they are different people or entities.

1. Start a file (hard copy or electronic) in which all relevant information regarding the enforcement action will be maintained. Log all communications with the property owner.
2. Compile existing information regarding the violation, such as:
    - Location and apparent source of the discharge
    - Description of the discharge
    - Date and method of discovery
    - Observations made by Town staff or contractors (including when, where, and by whom)
    - Property address, and property owner
    - Log of physical evidence (e.g., photos, samples, etc.).
3. Determine whether the matter should be referred to the Board of Health or handled by the Board of Selectmen or the Highway Department. If the latter, continue to follow the subsequent steps below.
4. Contact the property owner in person or by telephone to discuss the situation and attempt to get voluntary compliance. If the property owner agrees to remedy the situation, follow up with a letter memorializing the conversation and noting that failure to address the violation will result in enforcement action.
5. If the property owner cannot be contacted, send a "Notice of Violation" letter detailing the apparent violation and asking the property owner to contact the Board of Selectmen (or appropriate Highway Department or Board of Health staff) to discuss addressing the violation.
6. If entry onto private property is necessary to gather additional information, attempt to get consent from the property owner. If no consent is obtained, consult Town Counsel for assistance in obtaining an administrative warrant. Except in a true emergency, do not enter onto private property without consent or a warrant.
7. If voluntary compliance is not obtained, issue an Order under Stormwater Management Bylaw Chapter XIV section 10 (after review of the Order by Town Counsel, if possible).
    a. The Order shall include:
        - The name and address of the alleged violator
        - The address at which the violation is occurring or has occurred

- A statement specifying the nature of the violation
- A description of the actions needed to resolve the violation and come into compliance
- The deadline within which such actions must be completed
- A statement that, if the violator fails to come into compliance by the specified deadline, the Town may do the work necessary to resolve the violation and expenses times three thereof shall be charged to the violator.

b. The Order may require, without limitation:

- Elimination of illicit connections or discharges to the storm drain system
- Performance of monitoring, analyses and reporting
- That unlawful discharges, practices, or operations shall cease and desist
- Remediation of contamination caused by the illicit connection or discharge

c. The Order should note the following appeal procedure specified in the Bylaw: The decisions or orders of the Board of Selectmen shall be final. Further relief shall be to a court of competent jurisdiction.

8. If the Order is not complied with, consult with Town Counsel to determine next steps, which may include one or more of the following: a letter from Town Counsel stating the possibility of court action or removal of the connection by the Town; the filing of a civil or criminal complaint; and direct action by the Town to remedy the violation.

9. Pursuant to Section 10 of the Bylaw, if the Town of Hampden undertakes work to correct or mitigate any violation of this Bylaw, the Town of Hampden shall (within thirty (30) days after completing the work) notify the violator and the owner(s) of the property (if different) in writing of the costs incurred by the Town, including administrative costs, associated with that work.

   The violator and the property owner(s) shall be jointly and severally liable to pay the Town those costs within thirty (30) days of the receipt of that notice. The violator and/or the property owner(s) (if different) may file a written protest objecting to the amount or basis of costs with the Board of Selectmen within thirty (30) days of receipt of the notice. If the amount due is not received by the Town by the expiration of the time in which to file such a protest, or within sixty (60) after the final decision of the Board of Selectmen or (if appealed to court) a court of competent jurisdiction resolving that protest, the amount of the Town's costs shall be a special assessment against the property and shall constitute a lien on the property pursuant to G.L. c. 40, § 58. Interest shall accrue on any unpaid costs at the statutory rate, as provided in G.L. c. 59, § 57 after the thirty-first (31st) day at which the costs first became due.

10. All hard copy written correspondence to the property owner should be sent both by first class mail and certified mail with return receipt requested. Certified mail provides proof of mailing; first class mail is a backup to ensure that the correspondence is received even if the property owner refuses the certified mail delivery. All such correspondence should be copied to the Board of Health, Town Administrator, and Town Counsel.

11. Consult Town Counsel if civil or criminal court action is required.

5. APPROPRIATE METHODS FOR ELIMINATION OF THE ILLICIT DISCHARGE

The following table includes appropriate methods for elimination of the illicit connection or identified problem based on the type of illicit discharge.

Table 1
Appropriate Methods for Elimination of the Illicit Discharge

Type of Discharge	Source	Elimination Actions by Town
Sewage	Pipe break within right of way	Repair
	Commercial or Industrial Direct Connection	Enforcement
	Residential Direct Connection	Enforcement
	Infrequent/transient discharge (e.g., RV dumping)	Enforcement; Spill Response
	Septic	Enforcement; Incentive or Aid
	Pet Waste	Warning; Education; Enforcement
Wash Water	Commercial or Industrial Direct Connection	Enforcement
	Residential Direct Connection	Enforcement
	Commercial Car Wash	Enforcement
	Household maintenance related activities	Warning and Education
Liquid Wastes	Professional oil change / car maintenance	Enforcement; Spill Response
	Heating oil / solvent dumping	Enforcement; Spill Response
	Homeowner oil change, other liquid waste disposal	Education; Enforcement
	Spill (trucking)	Spill Response
	Other industrial wastes	Spill Response
Solid Waste or Obstructions	Trash or garbage	Enforcement
	Erosion from Construction	Enforcement
	Erosion from Landscaping (e.g., mulch)	Warning; Education; Enforcement

6. PROCESS FOR DOCUMENTATION AND VERIFICATION OF REMOVAL OF THE CONNECTION OR THE DISCHARGE

Verification of removal of the connection must include water quality sampling for sanitary wastewater and may include visual inspection, dye-testing, CCTV inspections, or damming techniques, as described in Section 2.3.4.5.c of the 2016 Small MS4 General Permit.

In accordance with the IDDE Plan and the 2016 Small MS4 General Permit, documentation will be kept in Appendix H of the IDDE Plan or at the Highway Department and will include, at a minimum:

- Discharge and source location
- Description of the discharge
- Date and method of discovery
- Date of elimination, repair or enforcement action or planned corrective measures and a schedule for completing the illicit discharge removal
- Date and method to confirm removal
- Estimate of flow volume removed

Town of Hampden IDDE Program

Appendix F

Written Procedures and Forms

OUTFALL RECONNAISSANCE INVENTORY/SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

SUBWATERSHED:	Outfall ID:	**LOCATION:**
Today's date:	Time (Military):	
INVESTIGATORS:		
TEMPERATURE (°F):	**RAINFALL (IN.): LAST 72 HOURS:**	**LAST 24 HOURS:**
Photo #s and short description:		

Land Use in Drainage Area (Check all that apply):

☐ Industrial (Known Industries):_____)
☐ Residential
☐ Commercial/Institutional
☐ Open Space – Field
☐ Open Space – Wooded
Other: _____

Notes (e.g., origin of outfall, if known):

Section 2: Outfall Description

MATERIAL		SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ RCP	☐ CMP	☐ Circular	☐ Single	Diameter/Dimensions: _____	In Water: ☐ No ☐ Partially ☐ Fully
☐ PVC	☐ HDPE	☐ Elliptical	☐ Double	**SLOPE (DEGREES)**	With Sediment: ☐ No ☐ Partially ☐ Fully
☐ DI/CI	☐ Clay	☐ Box	☐ Triple	☐ Flat ☐ Moderate ☐ Steep	
☐ Other: _____		☐ Other: _____	☐ Other: _____		

PIPE CONDITION	☐ Good ☐ Cracked ☐ Clogged with Debris ☐ Crushed ☐ Deteriorated (concrete) ☐ Corroded (metal) ☐ Other _____		
OUTLET STRUCTURE	☐ Headwall ☐ Riprap ☐ Flared End ☐ No Outfall Protection ☐ Other _____		
In-Stream *(applicable when collecting samples)*	☐ Yes ☐ No	**Maintenance/Repair Needed?**	☐ **No** ☐ **Yes** *(See Section 8 for more description)*
Flow Present?	☐ Yes ☐ No	***If No, Skip to Section 5***	
Flow Description	☐ Trickle ☐ Moderate ☐ Substantial **(If present)**		

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS			
PARAMETER (Threshold Level)	**RESULT**	**UNIT**	**EQUIPMENT**
TEMPERATURE (>83 ºF)		°F	YSI Meter or Thermometer
CONDUCTIVITY (> 2,000 UMHOS/cm)		umhos/cm	YSI Meter
SALINITY (> 0.5 PPT)		ppt	YSI Meter
DISSOLVED OXYGEN (< 5.0 mg/L)		mg/l	YSI Meter
AMMONIA (≥ 0.5 mg/L)		mg/l	Test Strips
CHLORINE (> 0.02 mg/L)		mg/l	Hach Pocket Colorimeter II

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
ODOR	☐	☐Sewage ☐Rancid/sour ☐Petroleum/gas ☐Sulfide ☐Other:	☐1 – Faint	☐2 – Easily detected	☐3 – Noticeable from a distance
COLOR	☐	☐Clear ☐Brown ☐Gray ☐Yellow ☐Green ☐Orange ☐Red ☐Other:	☐1 – Faint colors in sample bottle	☐2 – Clearly visible in sample bottle	☐3 – Clearly visible in outfall flow
TURBIDITY	☐	See severity	☐1 – Slight cloudiness	☐2 – Cloudy	☐3 – Opaque
FLOATABLES - DOES NOT INCLUDE TRASH!!	☐	☐Sewage (Toilet Paper, etc.) ☐Suds ☐Petroleum (oil sheen) ☐Other:	☐1 – Few/slight; origin not obvious	☐2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
DEPOSITS/STAINS	☐	☐None ☐Grease/Oil ☐Paper/Trash ☐Foam ☐Heavy sedimentation deposits ☐Other _____	
SURROUNDING VEGETATION	☐	☐Little or No Distress ☐Moderate Distress ☐High Distress	
ABNORMAL VEGETATION IN OUTFALL	☐	☐Excessive ☐Inhibited	
ERODIBILITY	☐	☐Little or No Erosion ☐Small Areas of Erosion ☐Many Eroded Areas	
POOR POOL QUALITY	☐	☐Odors ☐Colors ☐Floatables ☐Oil Sheen ☐Suds ☐Excessive Algae ☐Other:	
PIPE BENTHIC GROWTH	☐	☐Brown ☐Orange ☐Green ☐Other:	

Section 6: OVERALL OUTFALL CHARACTERIZATION AS AN ILLICIT DISCHARGE

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1.	**SAMPLE FOR THE LAB**?	☐ Surfactants	☐ Ammonia	☐ E. Coli	☐ Fecal Coliform	☐ Total Phosphorus
		☐ BOD_5	☐ None			
2.	If yes, collected from:		☐ Flow	☐ Pool		
3.	Intermittent flow trap recommended?	☐	☐ Yes	☐	☐ No	

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)? _____

The following document establishes procedures for sample collection, use of field kits, storage and conveyance of samples, and field data collection and storage requirements for dry weather sampling of outfalls in the Town of Hampden, MA in accordance with Section 2.3.4.7.b. of the EPA NPDES General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) in Massachusetts (General Permit).

1) Review supplies of sampling bottles and test kits on a weekly basis and order as necessary for field sampling activities.

2) Notify the Town of Hampden of sampling schedule prior to going into the field:

    a. Highway Department: (413) 566-8842

    b. Police Department: (413) 566-8011

3) Observe the physical attributes of each outfall or sampling location.

4) If dry weather flow is present, note flow volume, odor, and all other characteristics listed on the data collection form. If using an iPad, fill in form fields or drop-down menus as needed.

    a. In the event that the flow is too slow to sample, place a sandbag upstream of the outfall to capture flow and return to the site in 24 hours to obtain a sample.

    b. In the event that the outfall is submerged in the receiving water, record this information on the data sheet for the outfall and do not take a sample. An alternate sampling location at an upstream manhole should be located.

5) Take a photograph of the outfall with an iPad or camera. If possible, hold a piece of paper or a white board with the unique identifier written on it in the photograph. If using a GIS collection form, ensure the photograph is collected with the correct outfall identifier.

6) Sample storm drain outfalls as close to the outfall opening as possible, wearing a fresh pair of disposable gloves.

7) **Test Kits**. Using a sterile and pre-cleaned sampling bottle, collect the surface water with care to not disturb sediment materials or collect surface debris/scum as best possible. Use sampling pole if needed to safely reach the outfall. The collected water will be poured into the **surfactant** test tube, **chlorine** sample cell, and the remainder will be tested for **ammonia** with test strips. Follow the manufacturer instructions for all test kit procedures. All waste from the field test kits should be retained and disposed of according to manufacturer instructions.

8) **Meters**. A properly calibrated meter should be used to record the following parameters directly from the stream or outfall:

    a. Conductivity

    b. Salinity

    c. Temperature

When flow volume or depth is insufficient to immerse the meter probe, a clean sample bottle may be used to collect a sufficient volume of water to immerse the probe. In such instances, meter readings should be taken immediately.

9) **Threshold Levels**. In situ readings will be compared to field thresholds as follows:

Parameter	Threshold Level	Source
Ammonia	≥ 0.5 mg/L	EPA New England Bacterial Source Tracking Protocol
Chlorine	≥ 0.02 mg/L	EPA 2016 General Permit
Conductivity	> 2,000 uS/cm	Center for Watershed Protection
Salinity	> 0.5 ppt Rivers	EPA Voluntary Estuary Monitoring Manual
Surfactants	≥ 0.25 mg/L	EPA New England Bacterial Source Tracking Protocol
Temperature (°F)	> 83 °F	314 CMR 4.00 for Class B Warm Water
Dissolved Oxygen (DO)	< 5.0 mg/L	314 CMR 4.00 for Class B Warm Water

10) **Water quality samples** will be taken for laboratory analysis according to the following table. Each bottle will be marked with time, date, and outfall identifier, and parameter to be analyzed.

All Flowing Outfalls	Impaired Waterbodies[1]	EPA Approved Method for Analysis
Collect E. coli samples first, in a separate sterile sample bottle.	**All outfalls – Long Island Sound TMDL** Nitrogen (Total)	Nitrogen (Total): 351.1/351.2 + 353.2

Notes:

[1]There are no impaired waterbodies listed in the Massachusetts Year 2014 Integrated List within the Town of Hampden's Urbanized Area. Table will need to be updated when Massachusetts Integrated Lists of Waters are finalized.

[z] Constituents that are in *blue italics* will already be analyzed in-situ or as part of the 2016 Small MS4 General Permit sampling requirements, and do not require additional lab analysis.

Results should be recorded, custody forms completed, and samples placed in a cooler on ice. If using an iPad, fill in all form fields for sampling data, check parameter analysis box if a threshold was exceeded, and check outfall completed box when done. **Make note of the first bacteria sample time for determining the hold limit until lab analysis.**

Be sure to upload all data entry before leaving the site. If there is any doubt whether data was captured, duplicate information on paper forms.

Upon completion of sampling and return to the laboratory, all samples will be turned over to the appropriate sample custodian(s) and accompanied by an appropriate Chain-of-Custody ("COC") form.

11) **Equipment / Items Needed**

Field Equipment	Paperwork	Personal Gear
❑ Sample bottles (from lab with holding time and storage requirements)	❑ Signed Site Safety Plan	❑ Waders (or other appropriate footwear)
❑ Extra sample bottles in case of contamination, cracking, or loss	❑ Chain of Custody form filled out	❑ Insect repellant
❑ Sampling Pole	❑ Bottle Labels in Ziploc Bag	❑ Sunscreen
❑ Cooler with ice	❑ Field sheets	❑ Steel-toed boots (if opening manholes)
❑ Carry Caddy	❑ CWP Chapter 11	❑ Safety goggles
❑ Digital Camera or iPad	❑ Field maps	❑ Light colored long sleeve shirts and pants on-site
❑ Cell Phone or hand-held radio	❑ Sampling Plan & Locations	❑ Reflective safety vest
❑ First aid kit		❑ Business cards
❑ Flashlight or head lamp		
❑ Nitrile gloves		
❑ Tape measure		
❑ Water quality meter(s)		
❑ Chlorine Test Kit – use kits listed in EPA Bacteria Source Protocol 2012 Draft		
❑ 1-liter bottle		
❑ Watch with a second hand		
❑ Duct tape		
❑ Sharpies		
❑ Paper Towels		
❑ Glass Containers (3) for (1) surfactant kit liquid waste, (2) chloride kit liquid waste, and (3) surfactant kit glass ampules. All disposed of as hazardous waste.		
❑ Trash bag for gloves, etc.		
❑ White board/paper for unique outfall ID for photograph		

Chapter 11: The Outfall Reconnaissance Inventory

This chapter describes a simple field assessment known as the Outfall Reconnaissance Inventory (ORI). The ORI is designed to fix the geospatial location and record basic characteristics of individual storm drain outfalls, evaluate suspect outfalls, and assess the severity of illicit discharge problems in a community. Field crews should walk all natural and man-made streams channels with perennial and intermittent flow, even if they do not appear on available maps (Figure 19). The goal is to complete the ORI on every stream mile in the MS4 within the first permit cycle, starting with priority subwatersheds identified during the desktop analysis. The results of the ORI are then used to help guide future outfall monitoring and discharge prevention efforts.

11.1 Getting Started

The ORI requires modest mapping, field equipment, staffing and training resources. A complete list of the required and optional resources needed to perform an ORI is presented in Table 30. The ORI can be combined with other stream assessment tools, and may be supplemented by simple indicator monitoring. Ideally, a Phase II community should plan on surveying its entire drainage network at least once over the course of each five-year permit cycle. Experience suggests that it may take up to three stream walks to identify all outfalls.



Figure 19: Walk all streams and constructed open channels

Best Times to Start

Timing is important when scheduling ORI field work. In most regions of the country, spring and fall are the best seasons to perform the ORI. Other seasons typically have challenges such as over-grown vegetation or high groundwater that mask illicit discharges, or make ORI data hard to interpret[9].

Prolonged dry periods during the non-growing season with low groundwater levels are optimal conditions for performing an ORI. Table 31 summarizes some of the regional factors to consider when scheduling ORI surveys in your community. Daily weather patterns also determine whether ORI field work should proceed. In general, ORI field work should be conducted at least 48 hours after the last runoff-producing rain event.

Field Maps

The field maps needed for the ORI are normally generated during the desktop assessment phase of the IDDE program described in Chapter 5. This section

[9] Upon initial program start-up, the ORI should be conducted during periods of low groundwater to more easily identify likely illicit discharges. However, it should be noted that high water tables can increase sewage contamination in storm drain networks due to infiltration and inflow interactions. Therefore, in certain situations, seasonal ORI surveys may be useful at identifying these types of discharges. Diagnosis of this source of contamination, however, can be challenging.

Table 30: Resources Needed to Conduct the ORI		
Need Area	**Minimum Needed**	**Optional but Helpful**
Mapping	• Roads • Streams	• Known problem areas • Major land uses • Outfalls • Specific industries • Storm drain network • SIC-coded buildings • Septics
Field Equipment	• 5 one-liter sample bottles • Backpack • Camera (preferably digital) • Cell phones or hand-held radios • Clip boards and pencils • Field sheets • First aid kit • Flash light or head lamp • GPS unit • Spray paint (or other marker) • Surgical gloves • Tape measure • Temperature probe • Waders (snake proof where necessary) • Watch with a second hand	• Portable Spectrophotometer and reagents (can be shared among crews) • Insect repellant • Machete/clippers • Sanitary wipes or biodegradable soap • Wide-mouth container to measure flow • Test strips or probes (e.g., pH and ammonia)
Staff	• Basic training on field methodology • Minimum two staff per crew	• Ability to track discharges up the drainage system • Knowledge of drainage area, to identify probable sources. • Knowledge of basic chemistry and biology

Table 31: Preferred Climate/Weather Considerations for Conducting the ORI		
Preferred Condition	**Reason**	**Notes/Regional Factors**
Low groundwater (e.g., very few flowing outfalls)	High groundwater can confound results	In cold regions, do not conduct the ORI in the early spring, when the ground is saturated from snowmelt.
No runoff-producing rainfall within 48 hours	Reduces the confounding influence of storm water	The specific time frame may vary depending on the drainage system.
Dry Season	Allows for more days of field work	Applies in regions of the country with a “wet/ dry seasonal pattern.” This pattern is most pronounced in states bordering or slightly interior to the Gulf of Mexico or the Pacific Ocean.
Leaf Off	Dense vegetation makes finding outfalls difficult	Dense vegetation is most problematic in the southeastern United States. This criterion is helpful but not required.

provides guidance on the basic requirements for good field maps. First, ORI field maps do not need to be fancy. The scale and level of mapping detail will vary based on preferences and navigational skills of field crews. At a minimum, maps should have labeled streets and hydrologic features (USGS blue line streams, wetlands, and lakes), so field crews can orient themselves and record their findings spatially.

Field maps should delineate the contributing drainage area to major outfalls, but only if they are readily available. Urban landmarks such as land use, property boundaries, and storm drain infrastructure are also quite useful in the field. ORI field maps should be used to check the accuracy and quality of pre-existing mapping information, such as the location of outfalls and stream origins.

Basic street maps offer the advantage of simplicity, availability, and well-labeled road networks and urban landmarks. Supplemental maps such as a 1": 2000' scale USGS Quad sheet or finer scale aerial photograph are also recommended for the field. USGS Quad sheets are readily available and display major transportation networks and landmarks, "blue line" streams, wetlands, and topography. Quad maps may be adequate for less developed subwatersheds, but are not always accurate in more urban subwatersheds.

Recent aerial photographs may provide the best opportunity to navigate the subwatershed and assess existing land cover. Aerial photos, however, may lack topography and road names, can be costly, and are hard to record field notes on due to their darkness. GIS-ready aerial photos and USGS Quad sheets can be downloaded from the internet or obtained from local planning, parks, or public works agencies.

Field Sheets

ORI field sheets are used to record descriptive and quantitative information about each outfall inventoried in the field. Data from the field sheets represent the building blocks of an outfall tracking system allowing program managers to improve IDDE monitoring and management. A copy of the ORI field sheet is provided in Appendix D, and is also available as a Microsoft Word™ document. Program managers should modify the field sheet to meet the specific needs and unique conditions in their community.

Field crews should also carry an authorization letter and a list of emergency phone numbers to report any emergency leaks, spills, obvious illicit discharges or other water quality problems to the appropriate local authorities directly from the field. Local law enforcement agencies may also need to be made aware of the field work. Figure 20 shows an example of a water pollution emergency contact list developed by Montgomery County, MD.

Equipment

Basic field equipment needed for the ORI includes waders, a measuring tape, watch, camera, GPS unit, and surgical gloves (see Table 30). GPS units and digital cameras are usually the most expensive equipment items; however, some local agencies may already have them for other applications. Adequate ranging, water-resistant, downloadable GPS units can be purchased for less than $150. Digital cameras are preferred and can cost between $200 and $400, however, conventional or disposable cameras can also work, as long as they have flashes. Hand-held data recorders and customized software can be used to record text, photos, and GPS coordinates electronically in the field. While

these technologies can eliminate field sheets and data entry procedures, they can be quite expensive. Field crews should always carry basic safety items, such as cell phones, surgical gloves, and first aid kits.

Staffing

The ORI requires at least a two-person crew, for safety and logistics. Three person crews provide greater safety and flexibility, which helps divide tasks, allows one person to assess adjacent land uses, and facilitates tracing outfalls to their source. All crew members should be trained on how to complete the ORI and should have a basic understanding of illicit discharges and their water quality impact. ORI crews can be staffed by trained volunteers, watershed groups and college interns. Experienced crews can normally expect to cover two to three stream miles per day, depending on stream access and outfall density.

11.2 Desktop Analysis to Support the ORI

Two tasks need to be done in the office before heading out to the field. The major ORI preparation tasks include estimating the total stream and channel mileage in the subwatershed and generating field maps. The total mileage helps program managers scope out how long the ORI will take and how much it will cost. As discussed before, field maps are an indispensable navigational aid for field crews working in the subwatershed.

Delineating Survey Reaches

ORI field maps should contain a preliminary delineation of **survey reaches**. The stream network within your subwatershed should be delineated into discrete segments of relatively uniform character. Delineating survey reaches provides good stopping and starting points for field crews, which

WATER POLLUTION PHONE NUMBERS TO CALL WHEN A WATER QUALITY PROBLEM IS OBSERVED or TO OBTAIN FURTHER INFORMATION ABOUT WATER QUALITY ISSUES
Spring 2001

COUNTY AGENCIES

DEP: Department of Environmental Protection
DEPC: Division of Environmental Policy & Compliance
WMD: Watershed Management Division

DPS: Department of Permitting Services
LDS: Land Development Services
SWM: Stormwater Management
WS: Wells & Septic

INTER-COUNTY AGENCIES

MNCPPC: Maryland-National Capital Park & Planning Commission
WSSC: Washington Suburban Sanitary Commission
DHCD: Department of Housing & Community Development
DPWT: Department of Public Works & Transportation

PROBLEM/QUESTION	AGENCY & TELEPHONE NUMBER
ILLEGAL DUMPING HOTLINE	**DEPC: 240-777-7700** Daytime hours ←
	→ Nighttime hours **240/777-DUMP (3867) or 240-777-7788**
Blocked storm drain, inlet or pipe or erosion from public storm drain	DPWT: 240/777-ROAD (7623) Highway Maintenance)
Discolored public drinking water, odor to drinking water	301/206-4002
Erosion, flooding, drainage problems between private properties	DHCD: 240/777-3600 (Code Enforcement)
Erosion - stream banks on park land	MNCPPC: 301/495-2535
Fire & Rescue Services (emergencies: 911)	(Non-Emergencies): 240/777-0744
Recycling Programs/Special pick up services	DPWT: 240/777-6400 or 6466
Sanitary sewer problems	WSSC: 301/206-4002
Sediment (mud) from construction site entering streams	LDS: 240/777-6366
Septic Leaks/ Septic Tanks	WS: 240/777-6300
Stormwater Management, pond safety and maintenance	DEPC: 240/777-7744
Stormwater Management and Sediment Control Plan Review issues	SWM: 240/777-6320
Stream Clean-ups	WMD: 240/777-7712
Swimming Pool Discharges	DEPC: 240/777-7770
Trash and debris in parks and streams	MNCPPC: 301/495-2535
Water main break	WSSC: 301/206-4002
Water pollution	DEPC: 240/777-7770
(discharging, dumping, chemical spills into streams or storm drains)	LDS: 240/777-6260
Water quality monitoring programs for schools (Stream Teams)	WMD: 240/777-7714
Wells and Well Inspections	WS: 240/777-6300

askDEP.com

Figure 20: Example of a comprehensive emergency contact list for Montgomery County, MD

is useful from a data management and logistics standpoint. Each survey reach should have its own unique identifying number to facilitate ORI data analysis and interpretation. Figure 21 illustrates some tips for delineating survey reaches, and additional guidance is offered below:

- Survey reaches should be established above the confluence of streams and between road crossings that serve as a convenient access point.
- Survey reaches should be defined at the transition between major changes in land use in the stream corridor (e.g. forested land to commercial area).
- Survey reaches should generally be limited to a quarter mile or less in length. Survey reaches in lightly developed subwatersheds can be longer than those in more developed subwatersheds, particularly if uniform stream corridor conditions are expected throughout the survey reach.
- Access through private or public property should be considered when delineating survey reaches as permission may be required.

It should be noted that initial field maps are not always accurate, and changes may need to be made in the field to adjust survey reaches to account for conditions such as underground streams, missing streams or long culverts. Nevertheless, upfront time invested in delineating survey reaches makes it easier for field crews to perform the ORI.

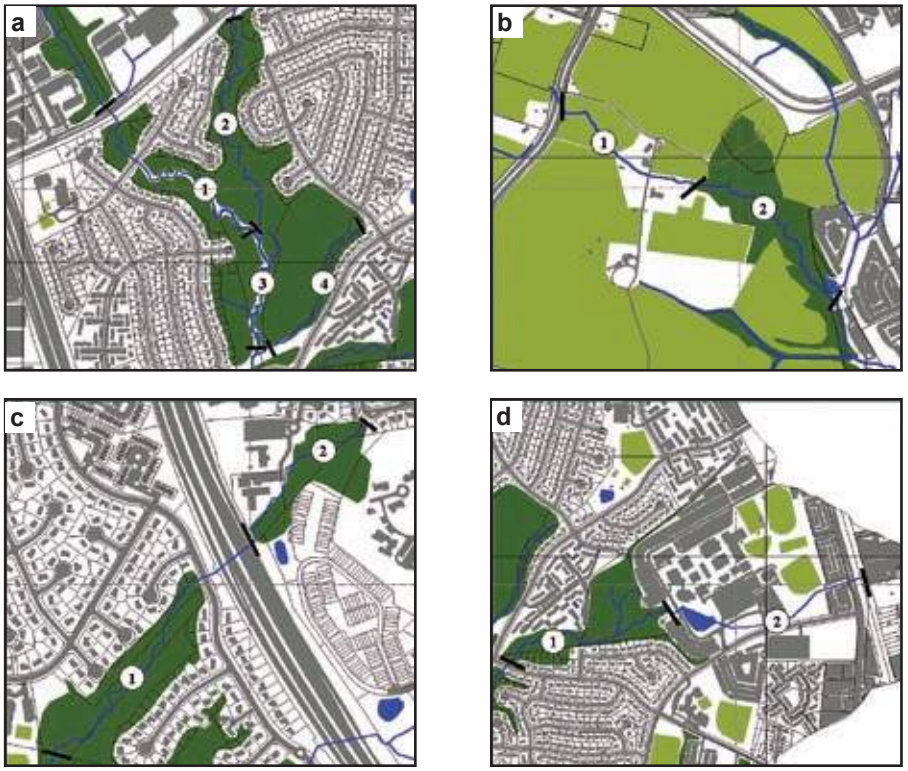


Figure 21: Various physical factors control how survey reaches are delineated. (a) Survey reaches based on the confluence of stream tributaries. (b) A long tributary split into ¼ mile survey reaches. (c) Based on a major road crossing (include the culvert in the downstream reach). (d) Based on significant changes in land use (significant changes in stream features often occur at road crossings, and these crossings often define the breakpoints between survey reaches).

11.3 Completing the ORI

Field crews conduct an ORI by walking all streams and channels to find outfalls, record their location spatially with a GPS unit and physically mark them with spray paint or other permanent marker. Crews also photograph each outfall and characterize its dimensions, shape, and component material, and record observations on basic sensory and physical indicators. If dry weather flow occurs at the outfall, additional flow and water quality data are collected. Field crews may also use field probes or test strips to measure indicators such as temperature, pH, and ammonia at flowing outfalls.

The ORI field sheet is divided into eight sections that address both flowing and non-flowing outfalls (Appendix D). Guidance on completing each section of the ORI field sheet is presented below.

Outfalls to Survey

The ORI applies to **all** outfalls encountered during the stream walk, regardless of diameter, with a few exceptions noted in Table 32. Common outfall conditions seen in communities are illustrated in Figure 22 As a rule, crews should only omit an outfall if they can definitively conclude it has no potential to contribute to a transitory illicit discharge. While EPA's Phase I guidance only targeted major outfalls (diameter of 36 inches or greater), documenting all outfalls is recommended, since smaller pipes make up the majority of all outfalls and frequently have illicit discharges (Pitt *et al.*, 1993 and Lalor, 1994). A separate ORI field sheet should be completed for each outfall.

Table 32: Outfalls to Include in the Screening

Outfalls to Record	Outfalls to Skip
• Both large and small diameter pipes that appear to be part of the storm drain infrastructure • Outfalls that appear to be piped headwater streams • Field connections to culverts • Submerged or partially submerged outfalls • Outfalls that are blocked with debris or sediment deposits • Pipes that appear to be outfalls from storm water treatment practices • Small diameter ductile iron pipes • Pipes that appear to only drain roof downspouts but that are subsurface, preventing definitive confirmation	• Drop inlets from roads in culverts (unless evidence of illegal dumping, dumpster leaks, etc.) • Cross-drainage culverts in transportation right-of-way (i.e., can see daylight at other end) • Weep holes • Flexible HDPE pipes that are known to serve as slope drains • Pipes that are clearly connected to roof downspouts via above-ground connections

 Ductile iron round pipe	 4-6” HDPE; Check if roof leader connection (legal)	 Field connection to inside of culvert; Always mark and record.
 Small diameter (<2”) HDPE; Often a sump pump (legal), or may be used to discharge laundry water (illicit).	 Elliptical RCP; Measure both horizontal and vertical diameters.	 Double RCP round pipes; Mark as separate outfalls unless known to connect immediately up-pipe
 Culvert (can see to other side); Don’t mark as an outfall	 Open channel “chute” from commercial parking lot; Very unlikely illicit discharge. Mark, but do not return to sample (unless there is an obvious problem).	 Small diameter PVC pipe; Mark, and look up-pipe to find the origin.
 CMP outfall; Crews should also note upstream sewer crossing.	 Box shaped outfall	 CMP round pipe with two weep holes at bridge crossing. (Don’t mark weep holes)

Figure 22: Typical Outfall Types Found in the Field

Obvious Discharges

Field crews may occasionally encounter an obvious illicit discharge of sewage or other pollutants, typified by high turbidity, odors, floatables and unusual colors. When obvious discharges are encountered, field crews should STOP the ORI survey, track down the source of the discharge and immediately contact the appropriate water pollution agency for enforcement. Crews should photo-document the discharge, estimate its flow volume and collect a sample for water quality analysis (if this can be done safely). All three kinds of evidence are extremely helpful to support subsequent enforcement. Chapter 13 provides details on techniques to track down individual discharges.

11.4 ORI Section 1 - Background Data

The first section of the ORI field sheet is used to record basic data about the survey, including time of day, GPS coordinates for the outfall, field crew members, and current and past weather conditions (Figure 23). Much of the information in this section is self-explanatory, and is used to create an accurate record of when, where, and under what conditions ORI data were collected.

Every outfall should be photographed and marked by directly writing a unique identifying number on each outfall that serves as its subwatershed "address" (Figure 24). Crews can use spray paint or another temporary marker to mark outfalls, but may decide to replace temporary markings with permanent ones if the ORI is repeated later. Markings help crews confirm outfall locations during future investigations, and gives citizens a better way to report the location of spills or discharges when calling a water pollution hotline. Crews should mark the spatial location of all outfalls they encounter directly on field maps, and record the coordinates with a GPS unit that is accurate to within 10 feet. Crews should take a digital photo of each outfall, and record photo numbers in Section 1 of the field sheet.

Section 1: Background Data

Subwatershed:		Outfall ID:	
Today's date:		Time (Military):	
Investigators:		Form completed by:	
Temperature (°F):	Rainfall (in.): Last 24 hours: Last 48 hours:		
Latitude:	Longitude:	GPS Unit:	GPS LMK #:
Camera:		Photo #s:	
Land Use in Drainage Area (Check all that apply):			
☐ Industrial		☐ Open Space	
☐ Ultra-Urban Residential		☐ Institutional	
☐ Suburban Residential		Other: _____	
☐ Commercial		Known Industries: _____	
Notes (e.g., origin of outfall, if known):			

Figure 23: Section 1 of the ORI Field Sheet



Figure 24: Labeling an outfall (a variety of outfall naming conventions can be used)

The land use of the drainage area contributing to the outfall should also be recorded. This may not always be easy to characterize at large diameter outfalls that drain dozens or even hundreds of acres (unless you have aerial photographs). On the other hand, land use can be easily observed at smaller diameter outfalls, and in some cases, the specific origin can be found (e.g., a roof leader or a parking lot; Figure 25). The specific origin should be recorded in the "notes" portion of Section 1 on the field sheet.

11.5 ORI Section 2 - Outfall Description

This part of the ORI field sheet is where basic outfall characteristics are noted (Figure 26). These include material, and presence of flow at the outfall, as well as the pipe's dimensions (Figure 27). These measurements are used to confirm and supplement existing storm drain maps (if they are available). Many communities only map storm drain outfalls that exceed a given pipe diameter, and may not contain data on the material and condition of the pipe.



Figure 25: The origin of this corrugated plastic pipe was determined to be a roof leader from the house up the hill.

Section 2 of the field sheet also asks if the outfall is submerged in water or obstructed by sediment and the amount of flow, if present. Figure 28 provides some photos that illustrate how to characterize relative submergence, deposition and flow at outfalls. If no flow is observed at the outfall, you can skip the next two sections of the ORI field sheet and continue with Section 5.

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ **Closed Pipe**	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☐ Circular ☐ Eliptical ☐ Box ☐ Other: _____	☐ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: _____	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☐ **Open drainage**	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☐ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Figure 26: Section 2 of the ORI Field Sheet



Figure 27: Measuring Outfall Diameter



Submerged: More than ½ below water



Partially submerged: Bottom is below water



Fully submerged: Can't see outfall



Outfall fully submerged by debris



Fully submerged from downstream trees trapping debris



Partially submerged by leaf debris "back water"



Trickle Flow: Very narrow stream of water



Moderate Flow: Steady stream, but very shallow depth



Significant flow (Source is a fire hydrant discharge)

Figure 28: Characterizing Submersion and Flow

11.6 ORI Section 3 - Quantitative Characterization for Flowing Outfalls

This section of the ORI records direct measurements of **flowing outfalls**, such as flow, temperature, pH and ammonia (Figure 29). If desired, additional water quality parameters can be added to this section. Chapter 12 discusses the range of water quality parameters that can be used.

Field crews measure the rate of flow using one of two techniques. The first technique simply records the time it takes to fill a container of a known volume, such as a one liter sample bottle. In the second technique,

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Figure 29: Section 3 of the ORI Field Sheet

the crew measures the velocity of flow, and multiplies it by the estimated cross sectional area of the flow.

To use the flow volume technique, it may be necessary to use a "homemade" container to capture flow, such as a cut out plastic milk container that is marked to show a one liter volume. The shape and flexibility of plastic containers allows crews to capture relatively flat and shallow flow (Figure 30). The flow volume is determined as the volume of flow captured in the container per unit time.

The second technique measures flow rate based on velocity and cross sectional area, and is preferred for larger discharges where containers are too small to effectively capture the flow (Figure 31). The crew measures and marks off a fixed flow length (usually about five feet), crumbles leaves or other light material, and drops them into the discharge (crews can also carry peanuts or ping pong balls to use). The crew then measures the time it takes the marker to travel across the length. The velocity of flow is computed as the length of the flow path (in feet) divided by the travel time (in seconds). Next, the cross-sectional flow area is measured by taking multiple readings of the depth and width of flow. Lastly, cross-sectional area (in square feet) is multiplied by flow velocity (feet/second) to calculate the flow rate (in cubic feet/second).

Crews may also want to measure the quality of the discharge using relatively inexpensive probes and test strips (e.g., water temperature, pH, and ammonia). The choice of which indicator parameters to measure is usually governed by the overall IDDE monitoring framework developed by the community. Some communities have used probes or test strips to measure additional indicators such as conductivity, chlorine, and hardness. Research by Pitt (for this project) suggests that probes by Horiba for pH and conductivity are the most reliable and



Figure 30: Measuring flow (as volume per time)

accurate, and that test strips have limited value.

When probes or test strips are used, measurements should be made from a sample bottle that contains flow captured from the outfall. The exact measurement recorded by the field probe should be recorded in Section 3 of the field sheet. Some interpolation may be required for test strips, but do not interpolate further than the mid-range between two color points.

11.7 ORI Section 4 – Physical Indicators for Flowing Outfalls Only

This section of the ORI field sheet records data about four sensory indicators associated with **flowing outfalls**—odor, color, turbidity and floatables (Figure 32). Sensory indicators can be detected by smell or sight, and require no measurement equipment. Sensory indicators do not always reliably predict illicit discharge, since the senses can be fooled, and may result in a "false negative" (i.e., sensory indicators fail to detect an illicit discharge when one is actually present). Sensory indicators are important, however, in detecting the most severe or obvious discharges. Section 4 of the field sheet asks whether the sensory indicator is present, and if so, what is its severity, on a scale of one to three.



Figure 31: Measuring flow (as velocity times cross-sectional area)

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX M(1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Figure 32: Section 4 of the ORI Field Sheet

Odor

Section 4 asks for a description of any odors that emanate from the outfall and an associated severity score. Since noses have different sensitivities, the entire field crew should reach consensus about whether an odor is present and how severe it is. A severity score of one means that the odor is faint or the crew cannot agree on its presence or origin. A score of two indicates a moderate odor within the pipe. A score of three is assigned if the odor is so strong that the crew smells it a considerable distance away from the outfall.

TIP

Make sure the origin of the odor is the outfall. Sometimes shrubs, trash or carrion, or even the spray paint used to mark the outfall can confuse the noses of field crews.

Color

The color of the discharge, which can be clear, slightly tinted, or intense is recorded next. Color can be quantitatively analyzed in the lab, but the ORI only asks for a visual assessment of the discharge color and its intensity. The best way to measure color is to collect the discharge in a clear sample bottle and hold it up to the light (Figure 33). Field crews should also look for downstream plumes of color that appear to be associated with the outfall. Figure 34 illustrates the spectrum of colors that may be encountered during an ORI survey, and offers insight on how to rank the relative intensity or strength of discharge color. Color often helps identify industrial discharges; Appendix K provides guidance on colors often associated with specific industrial operations.

Turbidity

The ORI asks for a visual estimate of the turbidity of the discharge, which is a measure of the cloudiness of the water. Like color, turbidity is best observed in a clear sample bottle, and can be quantitatively measured using field probes. Crews should also look for turbidity in the plunge pool below the outfall, and note any downstream turbidity plumes that appear to be related to the outfall. Field crews can sometimes confuse turbidity with color, which are related but are not the same. Remember, turbidity is a measure of how easily light can penetrate through the sample bottle, whereas color is defined by the tint or intensity of the color observed. Figure 34 provides some examples of how to distinguish turbidity from color, and how to rank its relative severity.



Figure 33: Using a sample bottle to estimate color and turbidity



Color: Brown; Severity: 2
Turbidity Severity: 2



Color: Blue-green; Severity: 3
Turbidity Severity: 2



Highly Turbid Discharge
Color: Brown; Severity: 3
Turbidity Severity: 3



Sewage Discharge
Color: 3
Turbidity: 3



Paint
Color: White; Severity: 3
Turbidity: 3



Industrial Discharge
Color: Green; Severity: 3
Turbidity Severity: 3



Blood
Color: Red; Severity: 3
Turbidity Severity: None



Failing Septic System:
Turbidity Severity: 3



Turbidity in Downstream Plume
Turbidity Severity: 2
(also confirm with sample bottle)



High Turbidity in Pool
Turbidity Severity: 2
(Confirm with sample bottle)



Iron Floc
Color: Reddish Orange; Severity: 3
(Often associated with a natural source)



Slight Turbidity
Turbidity: 1
(Difficult to interpret this observation; May be natural or an illicit discharge)

Construction Site Discharge
Turbidity Severity: 3





Discharge of Rinse from Floor Sanding
(Found during wet weather)
Turbidity Severity: 3

Figure 34: Interpreting Color and Turbidity

Floatables

The last sensory indicator is the presence of any floatable materials in the discharge or the plunge pool below. Sewage, oil sheen, and suds are all examples of floatable indicators; trash and debris are generally not in the context of the ORI. The presence of floatable materials is determined visually, and some guidelines for ranking their severity are provided in Figure 35, and described below.

If you think the floatable is sewage, you should automatically assign it a severity score of three since no other source looks quite like it. Surface oil sheens are ranked based on their thickness and coverage. In some cases, surface sheens may not be related to oil discharges, but instead are created by in-stream processes, such as shown in Figure 36. A thick or swirling sheen associated with a petroleum-like odor may be diagnostic of an oil discharge.

Suds are rated based on their foaminess and staying power. A severity score of three is designated for thick foam that travels many feet before breaking up. Suds that break up quickly may simply reflect water turbulence, and do not necessarily have an illicit origin. Indeed, some streams have naturally occurring foams due to the decay of organic matter. On the other hand, suds that are accompanied by a strong organic or sewage-like odor may indicate a sanitary sewer leak or connection. If the suds have a fragrant odor, they may indicate the presence of laundry water or similar wash waters.

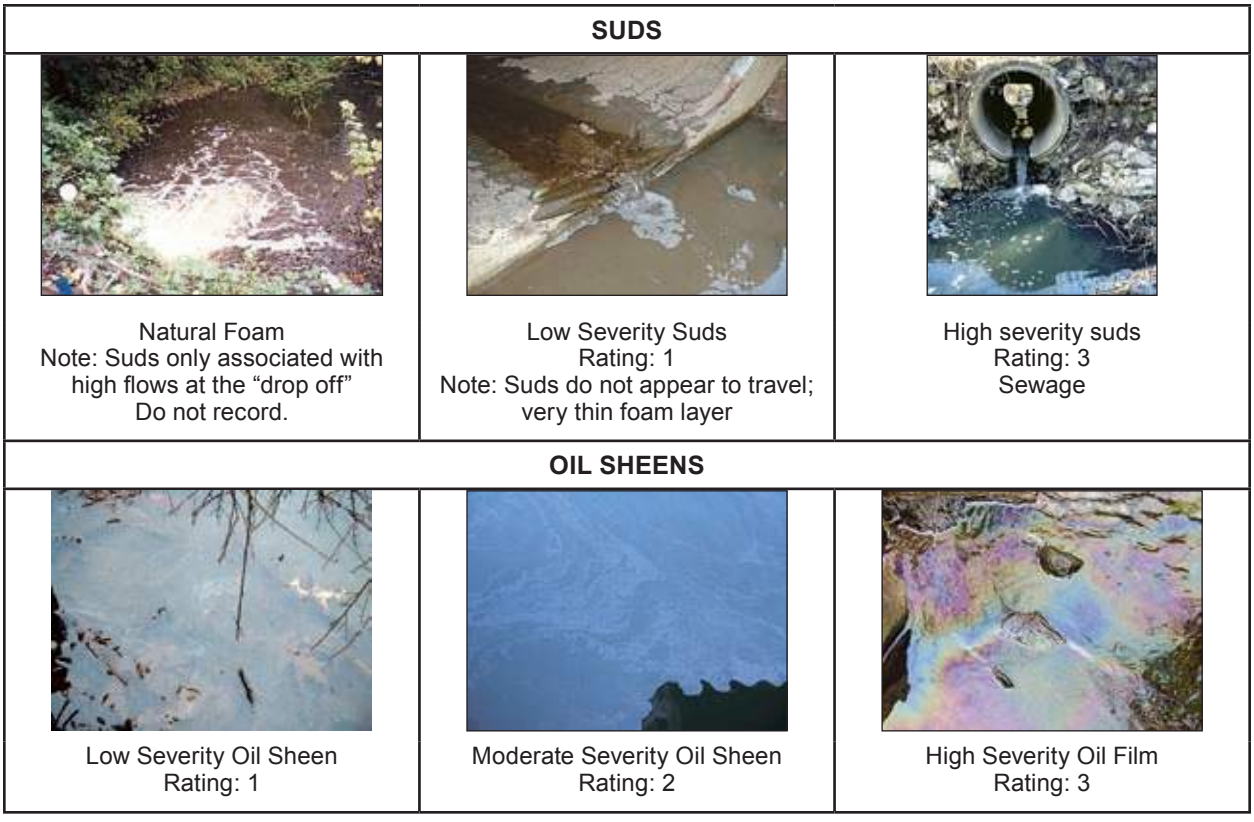


Figure 35: Determining the Severity of Floatables

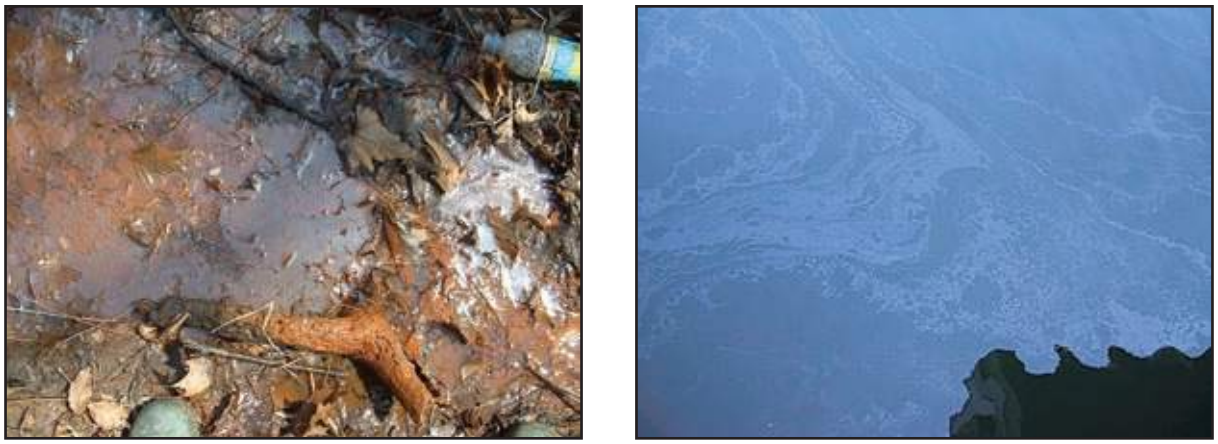


Figure 36: Synthetic versus Natural Sheen (a) Sheen from bacteria such as iron floc forms a sheet-like film that cracks if disturbed (b) Synthetic oil forms a swirling pattern

11.8 ORI Section 5 - Physical Indicators for Both Flowing and Non-Flowing Outfalls

Section 5 of the ORI field sheet examines physical indicators found at both **flowing and non-flowing** outfalls that can reveal the impact of past discharges (Figure 37). Physical indicators include outfall damage, outfall deposits or stains, abnormal vegetation growth, poor pool quality, and benthic growth on pipe surfaces. Common examples of physical indicators are portrayed in Figures 38 and 39. Many of these physical conditions can indicate that an intermittent or transitory discharge has occurred in the past, even if the pipe is not currently flowing. Physical indicators are not ranked according to their severity, because they are often subtle, difficult to interpret and could be caused by other sources. Still, physical indicators can provide strong clues about the discharge history of a storm water outfall, particularly if other discharge indicators accompany them.

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls
Are physical indicators that are not related to flow present? ☐ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Figure 37: Section 5 of the ORI Field Sheet



Bacterial growth at this outfall indicates nutrient enrichment and a likely sewage source.



This bright red bacterial growth often indicates high manganese and iron concentrations. Surprisingly, it is not typically associated with illicit discharges.



Sporalitis filamentous bacteria, also known as “sewage fungus” can be used to track down sanitary sewer leaks.



Algal mats on lakes indicate eutrophication. Several sources can cause this problem. Investigate potential illicit sources.



Illicit discharges or excessive nutrient application can lead to extreme algal growth on stream beds.



The drainage to this outfall most likely has a high nutrient concentration. The cause may be an illicit discharge, but may be excessive use of lawn chemicals.



This brownish algae indicates an elevated nutrient level.

Figure 38: Interpreting Benthic and Other Biotic Indicators



Reddish staining on the rocks below this outfall indicate high iron concentrations.



Toilet paper directly below the storm drain outlet.



Watershed Protection??



Trash is not an indicator of illicit discharges, but should be noted.



Staining at the base of the outfall may indicate a persistent, intermittent discharge.



Excessive vegetation may indicate enriched flows associated with sewage.



Brownish stain of unclear origin. May be from degradation of the brick infrastructure.



Cracked rock below the outfall may indicate an intermittent discharge.



Poor pool quality. Consider sampling from the pool to determine origin.

Figure 39: Typical Findings at Both Flowing and Non-Flowing Outfalls

11.9 ORI Sections 6-8 - Initial Outfall Designation and Actions

The last three sections of the ORI field sheet are where the crew designates the illicit discharge severity of the outfall and recommends appropriate management and monitoring actions (Figure 40). A discharge rating is designated as obvious, suspect, potential or unlikely, depending on the number and severity of discharge indicators checked in preceding sections.

It is important to understand that the ORI designation is only an initial determination of discharge potential. A more certain determination as to whether it actually is an illicit discharge is made using a more sophisticated indicator monitoring method. Nevertheless, the ORI outfall

designation gives program managers a better understanding of the distribution and severity of illicit discharge problems within a subwatershed.

Section 7 of the ORI field sheet records whether indicator samples were collected for laboratory analysis, or whether an intermittent flow trap was installed (e.g., an optical brightener trap or caulk dam described in Chapter 13). Field crews should record whether the sample was taken from a pool or directly from the outfall, and the type of intermittent flow trap used, if any. This section can also be used to recommend follow-up sampling, if the crew does not carry sample bottles or traps during the survey.

The last section of the ORI field sheet is used to note any unusual conditions near the outfall such as dumping, pipe failure, bank erosion or maintenance needs. While these maintenance conditions are not directly related to illicit discharge detection, they often are of interest to other agencies and utilities that maintain infrastructure.

11.10 Customizing the ORI for a Community

The ORI method is meant to be adaptable, and should be modified to reflect local conditions and field experience. Some indicators can be dropped, added or modified in the ORI form. This section looks at four of the most common adaptations to the ORI:

- Open Channels
- Submerged/Tidally Influenced Outfalls
- Cold Climates
- Use of Biological Indicators

In each case, it may be desirable to revise the ORI field sheet to collect data reflecting these conditions.

Open Channels

Field crews face special challenges in more rural communities that have extensive open channel drainage. The ditches and channels serve as the primary storm water conveyance system, and may lack storm drain and sewer pipes. The open channel network is often very long with only a few obvious outfalls that are located far apart. While the network can have illicit discharges from septic systems, they can typically only be detected in the ORI if a straight pipe is found. Some adaptations for open channel systems are suggested in Table 33.

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1.	Sample for the lab?	☐ Yes	☐ No	
2.	If yes, collected from:	☐ Flow	☐ Pool	
3.	Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

Figure 40: Sections 6-8 of the ORI Field Sheet

Submerged/Tidally Influenced Outfalls

The ORI can be problematic in coastal communities where outfalls are located along the waterfront and may be submerged at high tide. The ORI methods need to be significantly changed to address these constraints. Often, outfalls are initially located from offshore using canoes or boats, and then traced landward to the first manhole that is not tidally influenced. Field crews then access the storm drain pipe at the manhole and measure whatever indicators they can observe in the confined and dimly lit space. Table 33 recommends strategies to sample outfalls in the challenging environment of coastal communities.

Winter and Ice

Ice can be used as a discharge indicator in northern regions when ice forms in streams and pipes during the winter months (Figure 41). Because ice lasts for many weeks, and most illicit discharges are warm, astute field crews can interpret outfall history from ice melting patterns along pipes and streams. For example, exaggerated melting at a frozen or flowing outfall may indicate warm water from sewage or industrial discharge. Be careful, because groundwater is warm enough to cause some melting at below freezing temperatures. Also, ice acts like an intermittent flow trap, and literally freezes these discharges. Crews should also look for these traps to find any discolored ice within the pipe or below the outfall.

A final winter indicator is "rime ice," which forms when steam freezes. This beautiful ice formation is actually a good indicator of sewage or other relatively hot discharge that causes steam to form (Figure 41).

Biological Indicators

The diversity and pollution tolerance of various species of aquatic life are widely used as an indicator of overall stream health, and has sometimes been used to detect illicit discharges. One notable example is the presence of the red-eared slider turtle, which is used in Galveston, Texas to find sewage discharges, as they have a propensity for the nutrient rich waters associated with sewage (Figure 42).

Table 33: Special Considerations for Open Channels/Submerged Outfalls

OPEN CHANNELS	
Challenge	**Suggested Modification**
Too many miles of channel to walk	Stop walking at a given channel size or drainage area
Difficulty marking them	Mark on concrete or adjacent to earth channel
Interpreting physical indicators	For open channels with mild physical indicators, progress up the system to investigate further.
SUBMERGED/TIDALLY INFLUENCED OUTFALLS	
Challenge	**Suggested Modification**
Access for ORI – Tidal Influence	Access during low tide
Access for ORI – Always submerged	Access by boat or by shore walking
Interpreting physical indicators	For outfalls with mild physical indicators, also inspect from the nearest manhole that is not influenced by tides
Sampling (if necessary)	Sample "up pipe"



Figure 41: Cold climate indicators of illicit discharges



Figure 42: One biological indicator is this red-eared slider turtle

11.11 Interpreting ORI Data

The ORI generates a wealth of information that can provide managers with valuable insights about their illicit discharge problems, if the data are managed and analyzed effectively. The ORI can quickly define whether problems are clustered in a particular area or spread across the community. This section presents a series of methods to compile, organize and interpret ORI data, including:

1. Basic Data Management and Quality Control
2. Outfall Classification
3. Simple Suspect Outfall Counts
4. Mapping ORI Data
5. Subwatershed and Reach Screening
6. Characterizing IDDE Problems at the Community Level

The level of detail for each analysis method should be calibrated to local resources, program goals, and the actual discharge problems discovered in the stream corridor. In general, the most common conditions and problems will shape your initial monitoring strategy, which prioritizes the subwatersheds or reaches that will be targeted for more intensive investigations.

Program managers should analyze ORI data well before every stream mile is walked in the community, and use initial results to modify field methods. For example, if initial results reveal widespread potential problems, program managers may want to add more indicator monitoring to the ORI to track down individual discharge sources (see Chapter 12). Alternatively, if the same kind of discharge problem is repeatedly found, it may be wise to investigate whether there is a common source or activity generating it (e.g., high turbidity observed at many flowing outfalls as a result of equipment washing at active construction sites).

Basic Data Management and Quality Control

The ORI produces an enormous amount of raw data to characterize outfall conditions. It is not uncommon to compile dozens of individual ORI forms in a single subwatershed. The challenge is to devise a system to organize, process, and translate this data into simpler outputs and formats that can guide illicit discharge elimination efforts. The system starts with effective quality control procedures in the field.

Field sheets should be managed using either a three-ring binder or a clipboard. A small field binder offers the ability to quickly flip back and forth among the outfall forms. Authorization letters, emergency contact lists, and extra forms can also be tucked inside.

At the end of each day, field crews should regroup at a predetermined location to compare notes. The crew leader should confirm that all survey reaches and outfalls of interest have been surveyed, discuss initial findings, and deal with any logistical problems. This is also a good time to check whether field crews are measuring and recording outfall data in the same way, and are consistent in what they are (or are not) recording. Crew leaders should also use this time to review field forms for accuracy and thoroughness. Illegible handwriting should be neatened and details added to notes and any sketches. The crew leader should also organize the forms together into a single master binder or folder for future analysis.

Once crews return from the field, data should be entered into a spreadsheet or database. A Microsoft Access database is provided with this Manual as part of Appendix D (Figure 43), and is supplied on a compact disc with each hard copy. It can also be downloaded with Appendix D from http://www.stormwatercenter.net. Information stored in this database can easily be imported into a GIS for mapping purposes. The GIS can generate its own database table that allows the user to create subwatershed maps showing outfall characteristics and problem areas.

Once data entry is complete, be sure to check the quality of the data. This can be done quickly by randomly spot-checking 10% of the entered data. For example, if 50 field sheets were completed, check five of the spreadsheet or database entries. When transferring data into GIS, quality control maps that display labeled problem outfalls should be created. Each survey crew is responsible for reviewing the accuracy of these maps.

Outfall Classification

A simple outfall designation system has been developed to summarize the discharge potential for individual ORI field sheets. Table 34 presents the four outfall designations that can be made.

Table 34: Outfall Designation System Using ORI Data

Designation	Description
1. Obvious Discharge	Outfalls where there is an illicit discharge that doesn't even require sample collection for confirmation
2. Suspect Discharge	Flowing outfalls with high severity on one or more physical indicators
3. Potential Discharge	Flowing or non-flowing outfalls with presence of two or more physical indicators
4. Unlikely Discharge	Non-flowing outfalls with no physical indicators of an illicit discharge

Simple Suspect Outfall Counts

The first priority is to count the frequency of each outfall designation in the subwatershed or the community as a whole. This simple screening analysis counts the number of problem outfalls per stream mile (i.e., the sum of outfalls designated as having potential, suspected or obvious illicit discharge potential). The density of problem outfalls per stream mile is an important metric to target and screen subwatersheds.

Based on problem outfall counts, program managers may discover that a particular monitoring strategy may not apply to the community. For example, if few problem outfalls are found, an extensive follow-up monitoring program may not be needed, so that program resources can be shifted to pollution hotlines to report and control transitory discharges such as illegal dumping. The key point of this method is to avoid getting lost in the raw data, but look instead to find patterns that can shape a cost-effective IDDE program.

Mapping ORI Data

Maps are an excellent way to portray outfall data. If a GIS system is linked to the ORI database, maps that show the spatial distribution of problem outfalls, locations of dumping, and overall reach conditions can be easily generated. Moreover, GIS provides flexibility that allows for rapid updates to maps as new data are collected and compiled. The sophistication and detail of maps will depend on the initial findings, program goals, available software, and GIS capability.

Subwatershed maps are also an effective and important communication and education tool to engage stakeholders (e.g., public officials, businesses and community residents), as they can visually depict reach quality and the location of problem outfalls. The key point to remember is that maps are tools for understanding data. Try to map with a purpose in mind. A large number of cluttered maps may only confuse, while a smaller number with select data may stimulate ideas for the follow-up monitoring strategy.

Subwatershed and Survey Reach Screening

Problem outfall metrics are particularly valuable to screen or rank priority subwatersheds or survey reaches. The basic approach is simple: select the outfall metrics that are most important to IDDE program goals, and then see how individual subwatersheds or reaches rank in the process. This screening process can help determine which subwatersheds will be priorities for initial follow-up monitoring efforts. When feasible, the screening process should incorporate non-ORI data, such as existing dry weather water quality data, citizen complaints, permitted facilities, and habitat or biological stream indicators.

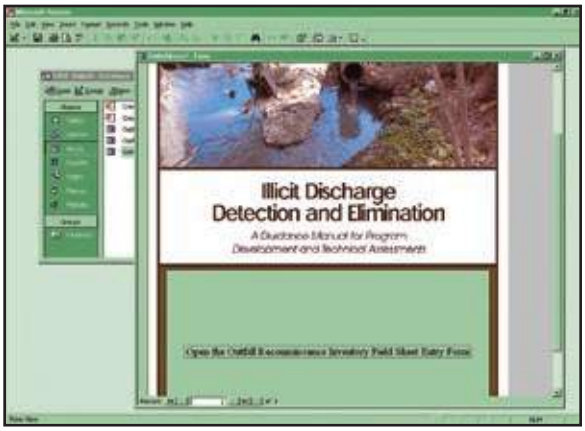


Figure 43: Sample screen from ORI Microsoft Access database

An example of how outfall metrics can screen subwatersheds is provided in Table 35. In this hypothetical example, four metrics were used to screen three subwatersheds within a community: number of suspect discharges, subwatershed population as a percent of the total community, number of industrial discharge permits, and number of outfalls per stream mile. Given these screening criteria, subwatershed C was selected for the next phase of detailed investigation.

Characterizing the IDDE Problem at the Community Level

ORI data should be used to continuously revisit and revise the IDDE program as more is learned about the nature and distribution of illicit discharge problems in the community. For example, ORI discharge designation should be compared against illicit discharge potential (IDP) predictions made during the original desktop analysis (Chapter 5) to refine discharge screening factors, and formulate new monitoring strategies.

In general, community illicit discharge problem can be characterized as minimal, clustered, or severe (Table 36). In the minimal scenario, very few and scattered problems exist; in the clustered scenario, problems are located in isolated subwatersheds; and in the severe scenario, problems are widespread.

Table 35: An Example of ORI Data Being Used to Compare Across Subwatersheds

	# of suspect discharges	Population as % of total community	# of industrial discharge permits	# of outfalls per stream/ conveyance mile
Subwatershed A	2	30	4	6
Subwatershed B	1	10	0	3
Subwatershed C	8	60	2	12

Table 36: Using Stream and ORI Data to Categorize IDDE Problems

Extent	ORI Support Data
Minimal	• Less than 10% of total outfalls are flowing • Less than 20% of total outfalls with obvious, suspect or potential designation
Clustered	• Two thirds of the flowing outfalls are located within one third of the subwatersheds • More than 20% of the communities subwatersheds have greater than 20% of outfalls with obvious, suspect or potential designation
Severe	• More than 10% of total outfalls are flowing • More than 50% of total outfalls with obvious, suspect or potential designation • More than 20% of total outfalls with obvious or suspect designation

11.12 Budgeting and Scoping the ORI

Many different factors come into play when budgeting and scoping an ORI survey: equipment needs, crew size and the stream miles that must be covered. This section presents some simple rules of thumb for ORI budgeting.

Equipment costs for the ORI are relatively minor, with basic equipment to outfit one team of three people totaling about $800 (Table 37). This cost includes one-time expenses to acquire waders, a digital camera and a GPS unit, as well as disposable supplies.

The majority of the budget for an ORI is for staffing the desktop analysis, field crews and data analysis. Field crews can consist of two or three members, and cover about two to three miles of stream (or open channel) per day. Three staff-days should be allocated for pre- and post-field work for each day spent in the field.

Table 38 presents example costs for two hypothetical communities that conduct the ORI. Community A has 10 miles of open channel to investigate, while Community B has 20 miles. In addition, Community A has fewer staff resources available and therefore uses two-person field crews, while Community B uses three-person field crews. Total costs are presented as annual costs, assuming that each community is able to conduct the ORI for all miles in one year.

Table 37: Typical Field Equipment Costs for the ORI

Item	Cost
100 Latex Disposable Gloves	$25
5 Wide Mouth Sample Bottles (1 Liter)	$20
Large Cooler	$25
3 Pairs of Waders	$150
Digital Camera	$200
20 Cans of Spray Paint	$50
Test Kits or Probes	$100-$500
1 GPS Unit	$150
1 Measuring Tape	$10
1 First Aid Kit	$30
Flashlights, Batteries, Labeling tape, Clipboards	$25
Total	**$785-$1185**

Table 38: Example ORI Costs		
Item	**Community A**	**Community B**
Field Equipment[1]	$700	$785
Staff Field Time[2]	$2,000	$6,000
Staff Office Time[3]	$3,000	$6,000
Total	**$5,700**	**$12,785**

[1] From Table 44
[2] Assumes $25/hour salary (2 person teams in Community A and three- person teams in Community B) and two miles of stream per day.
[3] Assumes three staff days for each day in field.

Chapter 13: Tracking Discharges To A Source

Once an illicit discharge is found, a combination of methods is used to isolate its specific source. This chapter describes the four investigation options that are introduced below.

Storm Drain Network Investigation

Field crews strategically inspect manholes within the storm drain network system to measure chemical or physical indicators that can isolate discharges to a specific segment of the network. Once the pipe segment has been identified, on-site investigations are used to find the specific discharge or improper connection.

Drainage Area Investigation

This method relies on an analysis of land use or other characteristics of the drainage area that is producing the illicit discharge. The investigation can be as simple as a "windshield" survey of the drainage area or a more complex mapping analysis of the storm drain network and potential generating sites. Drainage area investigations work best when prior indicator monitoring reveals strong clues as to the likely generating site producing the discharge.

On-site Investigation

On-site methods are used to trace the source of an illicit discharge in a pipe segment, and may involve dye, video or smoke testing within isolated segments of the storm drain network.

Septic System Investigation

Low-density residential watersheds may require special investigation methods if they are not served by sanitary sewers and/or storm water is conveyed in ditches or swales. The major illicit discharges found in low-density development are failing septic systems and illegal dumping. Homeowner surveys, surface inspections and infrared photography have all been effectively used to find failing septic systems in low-density watersheds.

13.1 Storm Drain Network Investigations

This method involves progressive sampling at manholes in the storm drain network to narrow the discharge to an isolated pipe segment between two manholes. Field crews need to make two key decisions when conducting a storm drain network investigation—where to start sampling in the network and what indicators will be used to determine whether a manhole is considered clean or dirty.

Where to Sample in the Storm Drain Network

The field crew should decide how to attack the pipe network that contributes to a problem outfall. Three options can be used:

- Crews can work progressively up the trunk from the outfall and test manholes along the way.
- Crews can split the trunk into equal segments and test manholes at strategic junctions in the storm drain system.
- Crews can work progressively down from the upper parts of the storm drain network toward the problem outfall.

The decision to move up, split, or move down the trunk depends on the nature and land use of the contributing drainage area. Some guidance for making this decision is provided in Table 53. Each option requires different levels of advance preparation. Moving up the trunk can begin immediately when an illicit discharge is detected at the outfall, and only requires a map of the storm drain system. Splitting the trunk and moving down the system require a little more preparation to analyze the storm drain map to find the critical branches to strategically sample manholes. Accurate storm drain maps are needed for all three options. If good mapping is not available, dye tracing can help identify manholes, pipes and junctions, and establish a new map of the storm drain network.

Option 1: Move up the Trunk

Moving up the trunk of the storm drain network is effective for illicit discharge problems in relatively small drainage areas. Field crews start with the manhole closest to the outfall, and progressively move up the network, inspecting manholes until indicators reveal that the discharge is no longer present (Figure 50). The goal is to isolate the discharge between two storm drain manholes.

Table 53: Methods to Attack the Storm Drain Network

Method	Nature of Investigation	Drainage System	Advance Prep Required
Follow the discharge up	Narrow source of an individual discharge	Small diameter outfall (< 36”) Simple drainage network	No
Split into segments	Narrow source of a discharge identified at outfall	Large diameter outfall (> 36”), Complex drainage Logistical or traffic issues may make sampling difficult.	Yes
Move down the storm drain	Multiple types of pollution, many suspected problems—possibly due to old plumbing practices or number of NPDES permits	Very large drainage area (> one square mile).	Yes

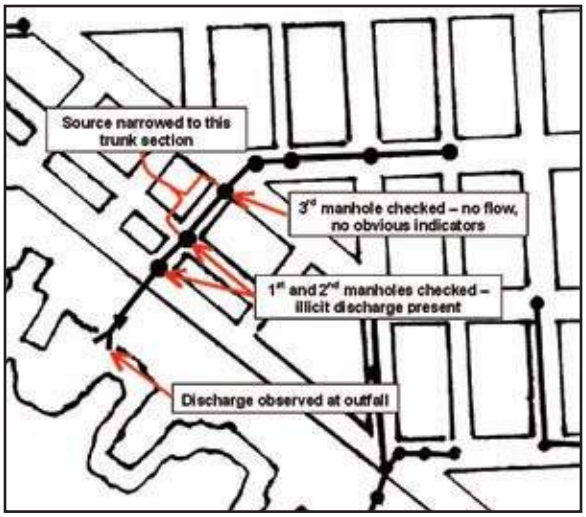


Figure 50: Example investigation following the source up the storm drain system

Option 2: Split the storm drain network

When splitting the storm drain network, field crews select strategic manholes at junctions in the storm drain network to isolate discharges. This option is particularly suited in larger and more complex drainage areas since it can limit the total number of manholes to inspect, and it can avoid locations where access and traffic are problematic.

The method for splitting the trunk is as follows:

1. Review a map of the storm drain network leading to the suspect outfall.
2. Identify major contributing branches to the trunk. The trunk is defined as the largest diameter pipe in the storm drain network that leads directly to the outfall. The "branches" are networks of smaller pipes that contribute to the trunk.
3. Identify manholes to inspect at the farthest downstream node of each contributing branch and one immediately upstream (Figure 51).
4. Working up the network, investigate manholes on each contributing branch and trunk, until the source is narrowed to a specific section of the trunk or contributing branch.
5. Once the discharge is narrowed to a specific section of trunk, select the appropriate on-site investigation method to trace the exact source.
6. If narrowed to a contributing branch, move up or split the branch until a specific pipe segment is isolated, and commence the appropriate on-site investigation to determine the source.

Option 3: Move down the storm drain network

In this option, crews start by inspecting manholes at the "headwaters" of the storm drain network, and progressively move down pipe. This approach works best in very large drainage areas that have many potential continuous and/or intermittent discharges. The Boston Water and Sewer Commission has employed the headwater option to investigate intermittent discharges in complex drainage areas up to three square miles (Jewell, 2001). Field crews certify that each upstream branch of the storm drain network has no contributing discharges before moving down pipe to a "junction manhole" (Figure 52). If discharges are found, the crew performs dye testing to pinpoint the discharge. The crew then confirms that the discharge is removed before moving farther down the pipe network. Figure 53 presents a detailed flow chart that describes this option for analyzing the storm drain network.

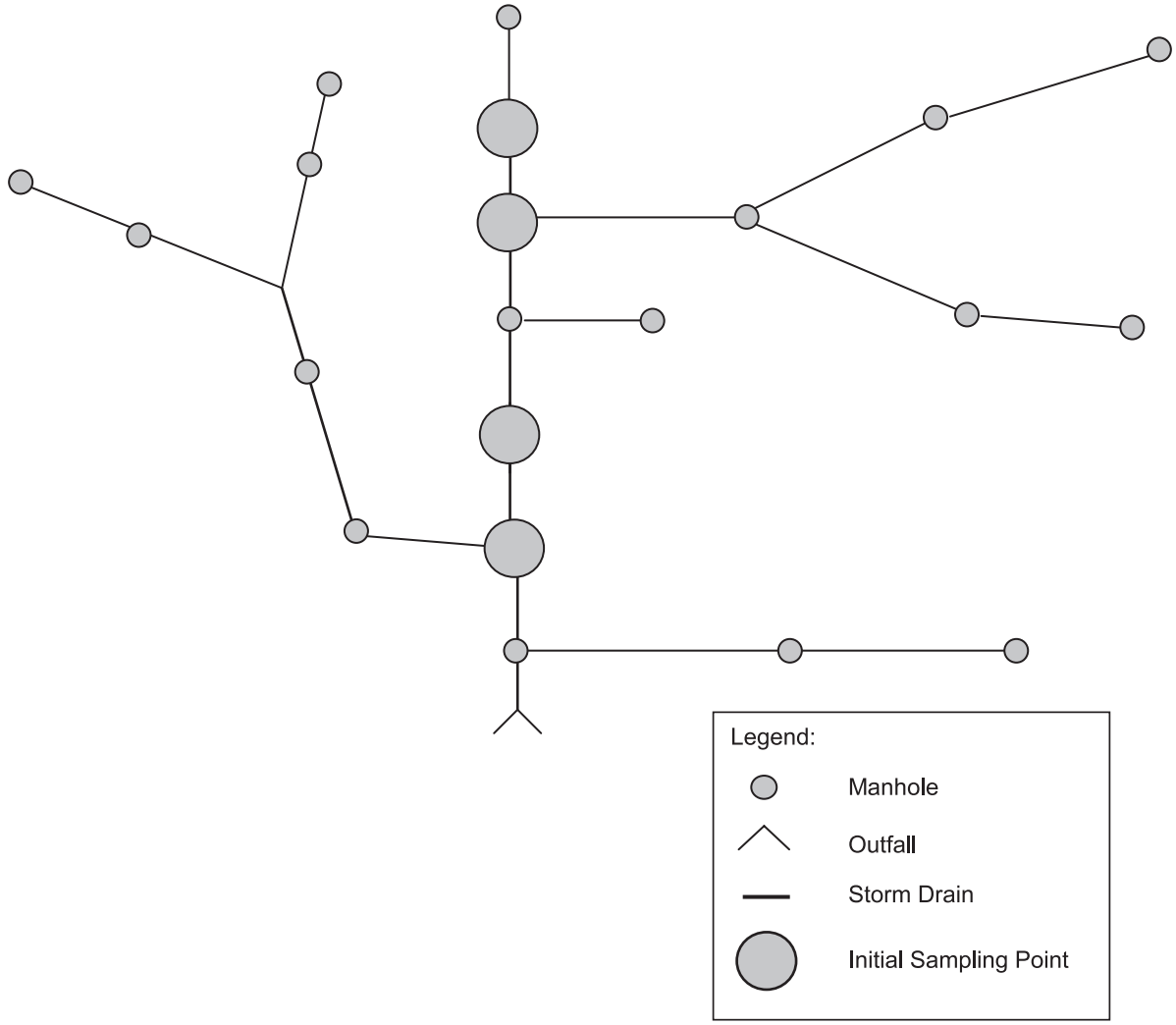


Figure 51: Key initial sampling points along the trunk of the storm drain

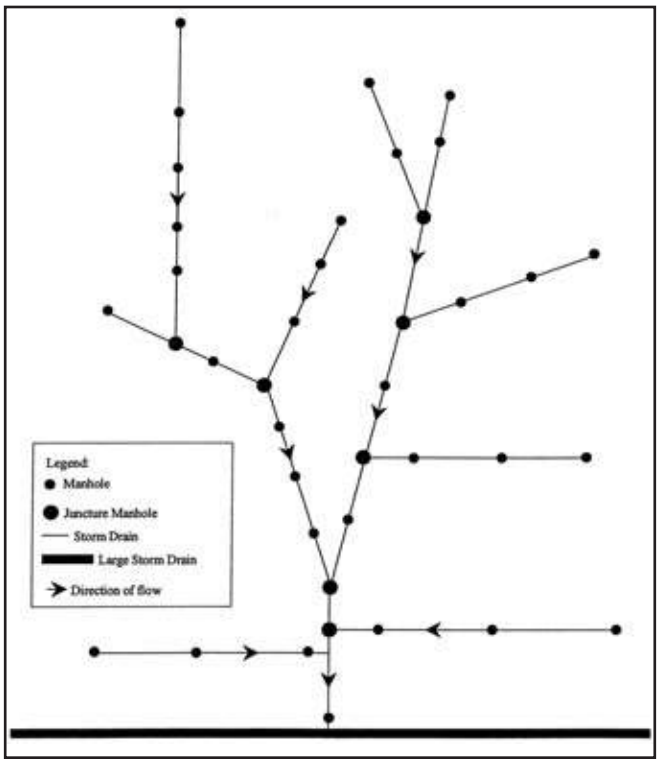


Figure 52: Storm Drain Schematic Identifying "Juncture Manholes" (Source: Jewell, 2001)

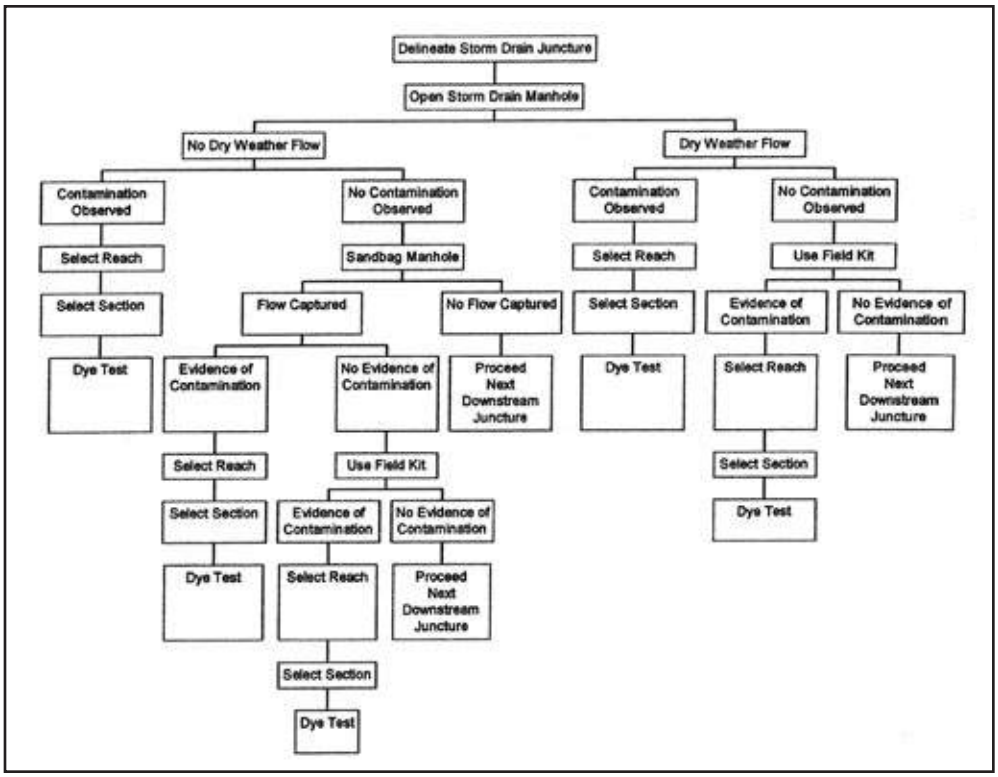


Figure 53: A Process for Following Discharges Down the Pipe (Source: Jewell, 2001)

Dye Testing to Create a Storm Drain Map

As noted earlier, storm drain network investigations are extremely difficult to perform if accurate storm drain maps are not available. In these situations, field crews may need to resort to dye testing to determine the flowpath within the storm drain network. Fluorescent dye is introduced into the storm drain network and suspected manholes are then inspected to trace the path of flow through the network (U.S. EPA, 1990). Two or three member crews are needed for dye testing. One person drops the dye into the trunk while the other(s) looks for evidence of the dye down pipe.

To conduct the investigation, a point of interest or down pipe "stopping point" is identified. Dye is then introduced into manholes upstream of the stopping point to determine if they are connected. The process continues in a systematic manner until an upstream manhole can no longer be determined, whereby a branch or trunk of the system can be defined, updated or corrected. More information on dye testing methods is provided in Section 13.3.

Manhole Inspection: Visual Observations and Indicator Sampling

Two primary methods are used to characterize discharges observed during manhole inspections—visual observations and indicator sampling. In both methods, field crews must first open the manhole to determine whether an illicit discharge is present. Manhole inspections require a crew of two and should be conducted during dry weather conditions.

Basic field equipment and safety procedures required for manhole inspections are outlined in Table 54. In particular, field crews need to be careful about how they will safely divert traffic (Figure 54). Other safety considerations include proper lifting of manhole covers to reduce the potential for back injuries, and testing whether any toxic or flammable fumes exist within the manhole before the cover is removed. Wayne County, MI has developed some useful operational procedures for inspecting manholes, which are summarized in Table 55.

Table 54: Basic Field Equipment Checklist

- Camera and film or digital camera
- Clipboards
- Field sheets
- Field vehicle
- First aid kit
- Flashlight or spotlight
- Gas monitor and probe
- Manhole hook/crow bar
- Mirror
- Storm drain, stream, and street maps
- Reflective safety vests
- Rubber / latex gloves
- Sledgehammer
- Spray paint
- Tape measures
- Traffic cones
- Two-way radios
- Waterproof marker/ pen
- Hand held global positioning satellite (GPS) system receiver (best resolution available within budget, at least 6' accuracy)



Figure 54: Traffic cones divert traffic from manhole inspection area

Table 55: Field Procedure for Removal of Manhole Covers
(Adapted from: Pomeroy et al., 1996)

Field Procedures:

1. Locate the manhole cover to be removed.
2. Divert road and foot traffic away from the manhole using traffic cones.
3. Use the tip of a crowbar to lift the manhole cover up high enough to insert the gas monitor probe. Take care to avoid creating a spark that could ignite explosive gases that may have accumulated under the lid. Follow procedures outlined for the gas monitor to test for accumulated gases.
4. If the gas monitor alarm sounds, close the manhole immediately. Do not attempt to open the manhole until some time is allowed for gases to dissipate.
5. If the gas monitor indicates the area is clear of hazards, remove the monitor probe and position the manhole hook under the flange. Remove the crowbar. Pull the lid off with the hook.
6. When testing is completed and the manhole is no longer needed, use the manhole hook to pull the cover back in place. Make sure the lid is settled in the flange securely.
7. Check the area to ensure that all equipment is removed from the area prior to leaving.

Safety Considerations:

1. Do not lift the manhole cover with your back muscles.
2. Wear steel-toed boots or safety shoes to protect feet from possible crushing injuries that could occur while handling manhole covers.
3. Do not move manhole covers with hands or fingers.
4. Wear safety vests or reflective clothing so that the field crew will be visible to traffic.
5. Manholes may only be entered by properly trained and equipped personnel and when all OSHA and local rules a.

Visual Observations During Manhole Inspection

Visual observations are used to observe conditions in the manhole and look for any signs of sewage or dry weather flow. Visual observations work best for obvious illicit discharges that are not masked by groundwater or other "clean" discharges, as shown in Figure 55. Typically, crews progressively inspect manholes in the storm drain network to look for contaminated flows. Key visual observations that are made during manhole inspections include:

- Presence of flow
- Colors
- Odors
- Floatable materials
- Deposits or stains (intermittent flows)



Figure 55: Manhole observation (left) indicates a sewage discharge. Source is identified at an adjacent sewer manhole that overflowed into the storm drain system (right).

Indicator Sampling

If dry weather flow is observed in the manhole, the field crew can collect a sample by attaching a bucket or bottle to a tape measure/rope and lowering it into the manhole (Figure 56). The sample is then immediately analyzed in the field using probes or other tests to get fast results as to whether the flow is clean or dirty. The most common indicator parameter is ammonia, although other potential indicators are described in Chapter 12.

Manhole indicator data is analyzed by looking for "hits," which are individual samples that exceed a benchmark concentration. In addition, trends in indicator concentrations are also examined throughout the storm drain network.



Figure 56: Techniques to sample from the storm drain

Figure 57 profiles a storm drain network investigation that used ammonia as the indicator parameter and a benchmark concentration of 1.0 mg/L. At both the outfall and the first manhole up the trunk, field crews recorded finding "hits" for ammonia of 2.2 mg/L and 2.3 mg/L, respectively. Subsequent manhole inspections further up the network revealed one manhole with no flow, and a second with a hit for ammonia (2.4 mg/L). The crew then tracked the discharge upstream of the second manhole, and found a third manhole with a low ammonia reading (0.05 mg/L) and a fourth with a much higher reading (4.3 mg/L). The crew then redirected its effort to sample above the fourth manhole with the 4.3 mg/L concentration, only to find another low reading. Based on this pattern, the crew concluded the discharge source was located between these two manholes, as nothing else could explain this sudden increase in concentration over this length of pipe.

The results of storm drain network investigations should be systematically documented to guide future discharge investigations, and describe any infrastructure maintenance problems encountered. An example of a sample manhole inspection field log is displayed in Figure 58.

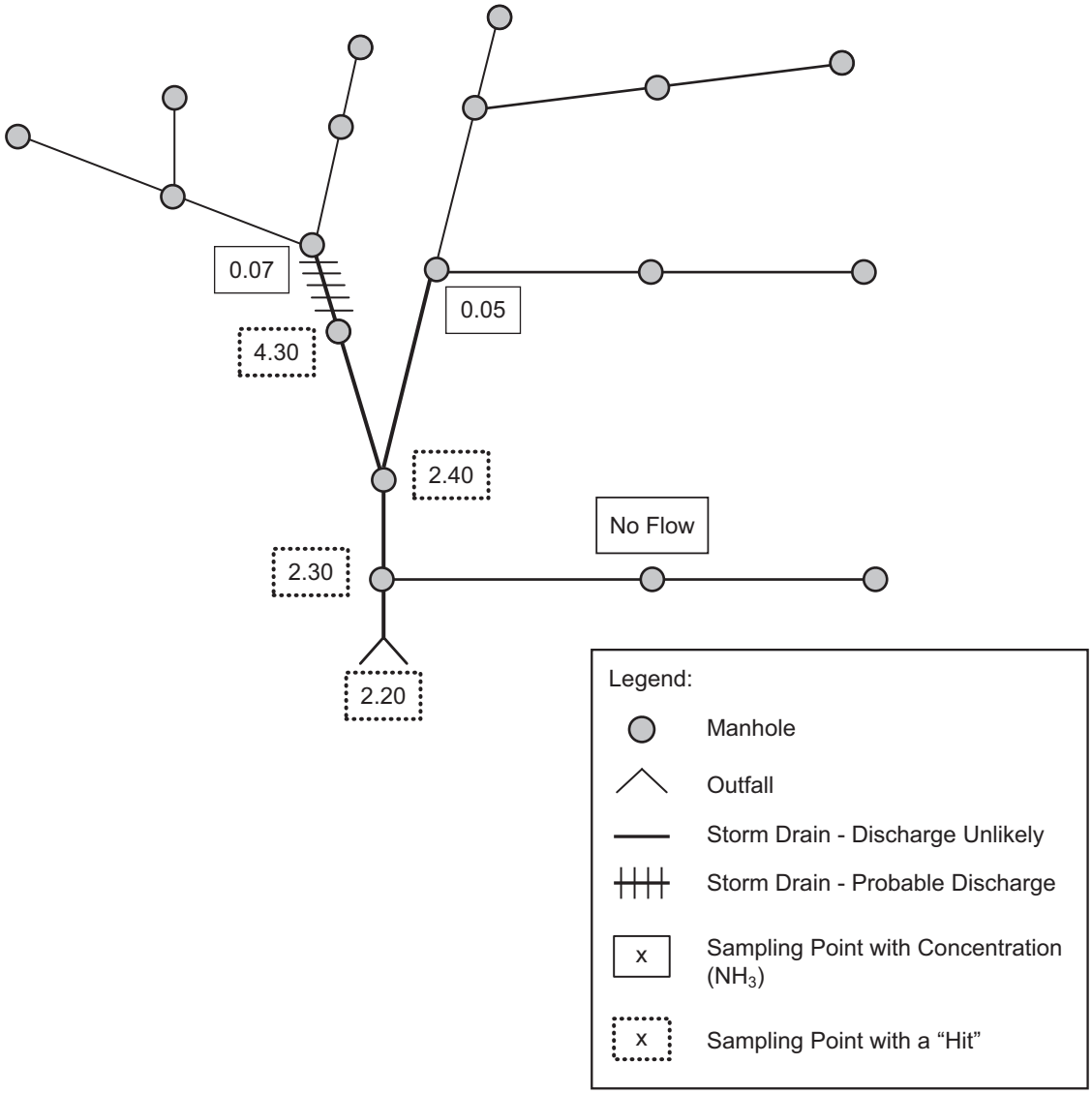
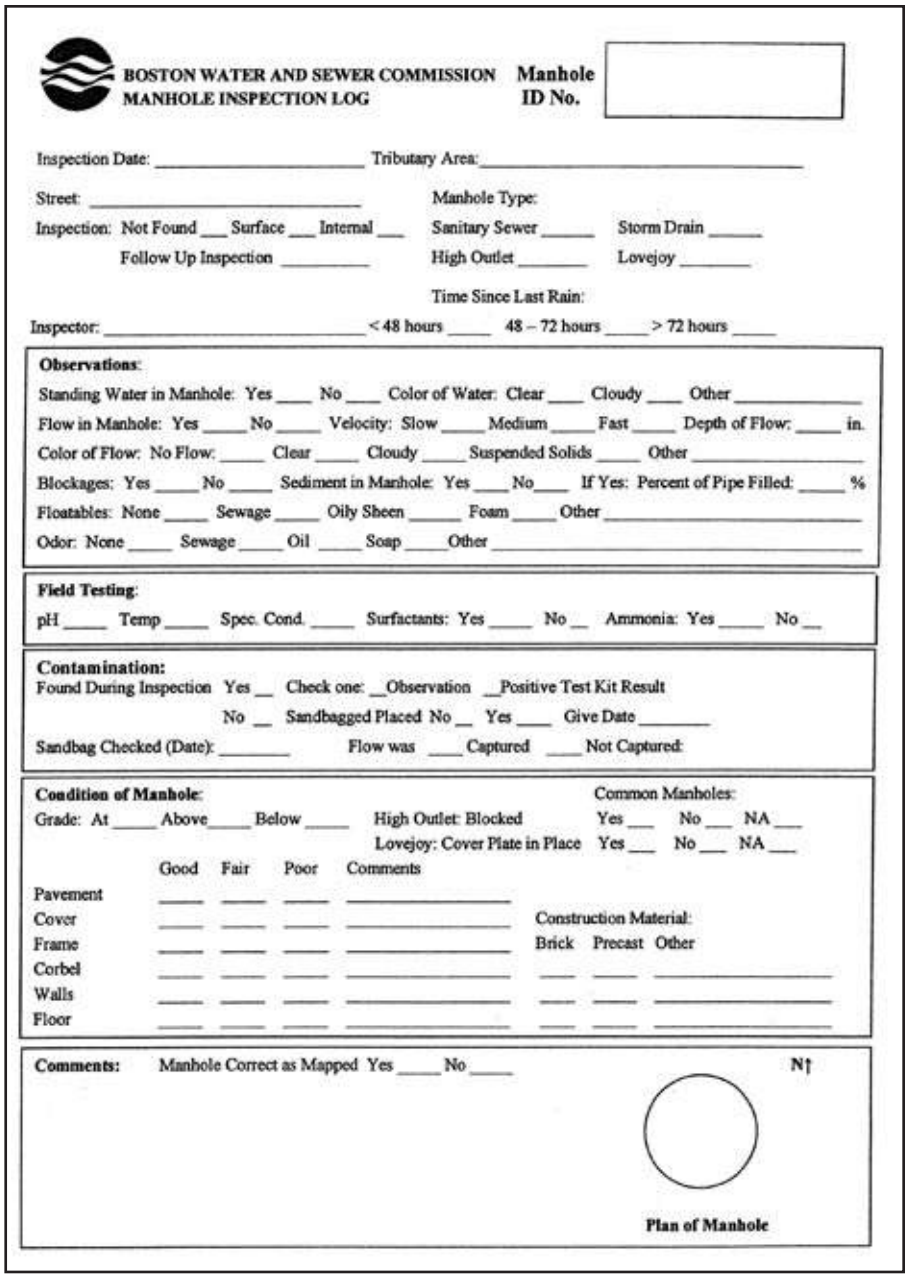


Figure 57: Use of ammonia as a trace parameter to identify illicit discharges



BOSTON WATER AND SEWER COMMISSION
MANHOLE INSPECTION LOG

Manhole ID No. _____

Inspection Date: _____ Tributary Area: _____

Street: _____ Manhole Type:

Inspection: Not Found ___ Surface ___ Internal ___ Sanitary Sewer _____ Storm Drain _____

Follow Up Inspection _____ High Outlet _____ Lovejoy _____

Time Since Last Rain:

Inspector: _____ < 48 hours _____ 48 – 72 hours _____ > 72 hours _____

Observations:

Standing Water in Manhole: Yes ____ No ____ Color of Water: Clear ____ Cloudy ____ Other _____

Flow in Manhole: Yes _____ No _____ Velocity: Slow _____ Medium _____ Fast _____ Depth of Flow: _____ in.

Color of Flow: No Flow: _____ Clear _____ Cloudy _____ Suspended Solids _____ Other _____

Blockages: Yes _____ No _____ Sediment in Manhole: Yes ____ No____ If Yes: Percent of Pipe Filled: _____ %

Floatables: None _____ Sewage _____ Oily Sheen _____ Foam _____ Other _____

Odor: None _____ Sewage _____ Oil _____ Soap _____ Other _____

Field Testing:

pH _____ Temp _____ Spec. Cond. _____ Surfactants: Yes _____ No __ Ammonia: Yes _____ No __

Contamination:

Found During Inspection Yes __ Check one: __Observation __Positive Test Kit Result

No __ Sandbagged Placed No __ Yes ____ Give Date _____

Sandbag Checked (Date): _____ Flow was ____ Captured ____ Not Captured:

Condition of Manhole: Common Manholes:

Grade: At _____ Above _____ Below _____ High Outlet: Blocked Yes ___ No ___ NA ___

Lovejoy: Cover Plate in Place Yes ___ No ___ NA ___

	Good	Fair	Poor	Comments	Construction Material: Brick	Precast	Other
Pavement	____	____	____	_____			
Cover	____	____	____	_____			
Frame	____	____	____	_____			
Corbel	____	____	____	_____	____	____	_____
Walls	____	____	____	_____	____	____	_____
Floor	____	____	____	_____	____	____	_____

Comments: Manhole Correct as Mapped Yes _____ No _____

N↑

Plan of Manhole

Figure 58: Boston Water and Sewer Commission Manhole Inspection Log (Source: Jewell, 2001)

Methods to isolate intermittent discharges in the storm drain network

Intermittent discharges are often challenging to trace in the storm drain network, although four techniques have been used with some success.

Sandbags

This technique involves placement of sandbags or similar barriers within strategic manholes in the storm drain network to form a temporary dam that collects any intermittent flows that may occur. Any flow collected behind the sandbag is then assessed using visual observations or by indicator sampling. Sandbags are lowered on a rope through the manhole to form a dam along the bottom of the storm drain, taking care not to fully block the pipe (in case it rains before the sandbag is retrieved). Sandbags are typically installed at junctions in the network to eliminate contributing branches from further consideration (Figure 59). If no flow collects behind the sandbag, the upstream pipe network can be ruled out as a source of the intermittent discharge.

Sandbags are typically left in place for no more than 48 hours, and should only be installed when dry weather is forecast. Sandbags should not be left in place during a heavy rainstorm. They may cause a blockage in the storm drain, or, they may be washed downstream and lost. The biggest downside to sandbagging is that it requires at least two trips to each manhole.

Optical Brightener Monitoring (OBM) Traps

Optical brightener monitoring (OBM) traps, profiled in Chapter 12, can also be used to detect intermittent flows at manhole junctions. When these absorbent pads are anchored in the pipe to capture dry weather flows, they can be used to determine the presence of flow and/or detergents. These OBM traps are frequently installed by lowering them into an open-grate drop inlet or storm drain inlet, as shown in Figure 60. The pads are then retrieved after 48 hours and are observed under a fluorescent light (this method is most reliable for undiluted washwaters).

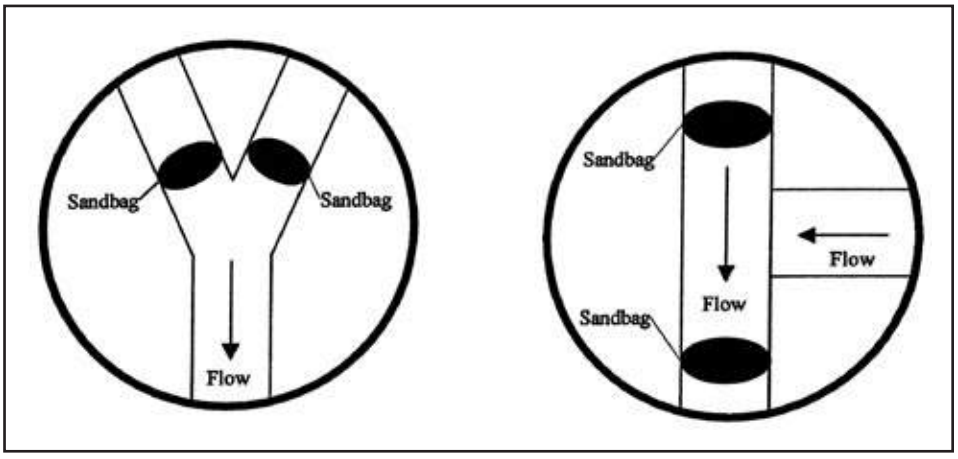


Figure 59: Example sandbag placement (Source: Jewell, 2001)



Figure 60: Optical Brightener Placement in the Storm Drain
(Source: Sargent and Castonguay, 1998)

Automatic Samplers

A few communities have installed automated samplers at strategic points within the storm drain network system that are triggered by small dry weather flows and collect water quality samples of intermittent discharges. Automated sampling can be extremely expensive, and is primarily used in very complex drainage areas that have severe intermittent discharge problems. Automated samplers can pinpoint the specific date and hours when discharges occur, and characterize its chemical composition, which can help crews fingerprint the generating source.

Observation of Deposits or Stains

Intermittent discharges often leave deposits or stains within the storm drain pipe or manhole after they have passed. Thus, crews should note whether any deposits or stains are present in the manhole, even if no dry weather flow is observed. In some cases, the origin of the discharge can be surmised by collecting indicator samples in the water ponded within the manhole sump. Stains and deposits, however, are not always a conclusive way to trace intermittent discharges in the storm drain network.

13.2 Drainage Area Investigations

The source of some illicit discharges can be determined through a survey or analysis of the drainage area of the problem outfall. The simplest approach is a rapid windshield survey of the drainage area to find the potential discharger or generating sites. A more sophisticated approach relies on an analysis of available GIS data and permit databases to identify industrial or other generating sites. In both cases, drainage area investigations are only effective if the discharge observed at an outfall has distinct or unique characteristics that allow crews to quickly ascertain the probable operation or business that is generating it. Often, discharges with a unique color, smell, or off-the-chart indicator sample reading may point to a specific industrial or commercial source. Drainage area investigations are not helpful in tracing sewage discharges, since they are often not always related to specific land uses or generating sites.

Rapid Windshield Survey

A rapid drive-by survey works well in small drainage areas, particularly if field crews are already familiar with its business operations. Field crews try to match the characteristics of the discharge to the most likely type of generating site, and then inspect all of the sites of the same type within the drainage area until the culprit is found. For example, if fuel is observed at an outfall, crews might quickly check every business operation in the catchment that stores or dispenses fuel. Another example is illustrated in Figure 61 where extremely dense algal growth was observed in a small stream during the winter. Field crews were aware of a fertilizer storage site in the drainage area, and a quick inspection identified it as the culprit.



Figure 61: Symptom (left): Discoloration of stream; Diagnosis: Extra hydroseed leftover from an upstream application (middle) was dumped into a storm drain by municipal officials (right).

A third example of the windshield survey approach is shown in Figure 62, where a very thick, sudsy and fragrant discharge was noted at a small outfall. The discharge appeared to consist of wash water, and the only commercial laundromat found upstream was confirmed to be the source. On-site testing may still be needed to identify the specific plumbing or connection generating the discharge.

Detailed Drainage Area Investigations

In larger or more complex drainage areas, GIS data can be analyzed to pinpoint the source of a discharge. If only general land use data exist, maps can at least highlight suspected industrial areas. If more detailed SIC code data are available digitally, the GIS can be used to pull up specific hotspot operations or generating sites that could be potential dischargers. Some of the key discharge indicators that are associated with hotspots and specific industries are reviewed in Appendix K.

13.3 On-site Investigations

On-site investigations are used to pinpoint the exact source or connection producing a discharge within the storm drain network. The three basic approaches are dye, video and smoke testing. While each approach can determine the actual source of a discharge, each needs to be applied under the right conditions and test limitations (see Table 56). It should be noted that on-site investigations are not particularly effective in finding *indirect* discharges to the storm drain network.



Figure 62: The sudsy, fragrant discharge (left) indicates that the laundromat is the more likely culprit than the florist (right).

Table 56: Techniques to Locate the Discharge		
Technique	**Best Applications**	**Limitations**
Dye Testing	• Discharge limited to a very small drainage area (<10 properties is ideal) • Discharge probably caused by a connection from an individual property • Commercial or industrial land use	• May be difficult to gain access to some properties
Video Testing	• Continuous discharges • Discharge limited to a single pipe segment • Communities who own equipment for other investigations	• Relatively expensive equipment • Cannot capture non-flowing discharges • Often cannot capture discharges from pipes submerged in the storm drain
Smoke Testing	• Cross-connection with the sanitary sewer • Identifying other underground sources (e.g., leaking storage techniques) caused by damage to the storm drain	• Poor notification to public can cause alarm • Cannot detect all illicit discharges

TIP

The Wayne County Department of the Environment provides excellent training materials on on-site investigations, as well as other illicit discharge techniques. More information about this training can be accessed from their website: http://www.wcdoe.org/Watershed/Programs___Srvcs_/IDEP/idep.htm.



Figure 63: Dye Testing Plumbing (NEIWPCC, 2003)

Dye Testing

Dye testing is an excellent indicator of illicit connections and is conducted by introducing non-toxic dye into toilets, sinks, shop drains and other plumbing fixtures (see Figure 63). The discovery of dye in the storm drain, rather than the sanitary sewer, conclusively determines that the illicit connection exists.

Before commencing dye tests, crews should review storm drain and sewer maps to identify lateral sewer connections and how they can be accessed. In addition, property owners must be notified to obtain entry permission. For industrial or commercial properties, crews should carry a letter to document their legal authority to gain access to the property. If time permits, the letter can be sent in advance of the dye testing. For residential properties, communication can be more challenging. Unlike commercial properties, crews are not guaranteed access to homes, and should call ahead to ensure that the owner will be home on the day of testing.

Communication with other local agencies is also important since any dye released to the storm drain could be mistaken for a spill or pollution episode. To avoid a costly and embarrassing response to a false alarm,

crews should contact key spill response agencies using a "quick fax" that describes when and where dye testing is occurring (Tuomari and Thomson, 2002). In addition, crews should carry a list of phone numbers to call spill response agencies in the event dye is released to a stream.

At least two staff are needed to conduct dye tests – one to flush dye down the plumbing fixtures and one to look for dye in the downstream manhole(s). In some cases, three staff may be preferred, with two staff entering the private residence or building for both safety and liability purposes.

The basic equipment to conduct dye tests is listed in Table 57 and is not highly specialized. Often, the key choice is the type of dye to use for testing. Several options are profiled in Table 58. In most cases, liquid dye is used, although solid dye tablets can also be placed in a mesh bag and lowered into the manhole on a rope (Figure 64). If a

Table 57: Key Field Equipment for Dye Testing
(Source: Wayne County, MI, 2000)

Maps, Documents
- Sewer and storm drain maps (sufficient detail to locate manholes)
- Site plan and building diagram
- Letter describing the investigation
- Identification (e.g., badge or ID card)
- Educational materials (to supplement pollution prevention efforts)
- List of agencies to contact if the dye discharges to a stream.
- Name of contact at the facility

Equipment to Find and Lift the Manhole Safely (small manhole often in a lawn)
- Probe
- Metal detector
- Crow bar
- Safety equipment (hard hats, eye protection, gloves, safety vests, steel-toed boots, traffic control equipment, protective clothing, gas monitor)

Equipment for Actual Dye Testing and Communications
- 2-way radio
- Dye (liquid or "test strips")
- High powered lamps or flashlights
- Water hoses
- Camera



Figure 64: Dye in a mesh bag is placed into an upstream manhole (left); Dye observed at a downstream manhole traces the path of the storm drain (right)

longer pipe network is being tested, and dye is not expected to appear for several hours, charcoal packets can be used to detect the dye (GCHD, 2002). Charcoal packets can be secured and left in place for a week or two, and then analyzed for the presence of dye. Instructions for using charcoal packets in dye testing can be accessed at the following website: http://bayinfo.tamug.tamu.edu/gbeppubs/ms4.pdf.

The basic drill for dye tests consists of three simple steps. First, flush or wash dye down the drain, fixture or manhole. Second, pop open downgradient sanitary sewer manholes and check to see if any dye appears. If none is detected in the sewer manhole after an hour or so, check downgradient storm drain manholes or outfalls for the presence of dye. Although dye testing is fairly straightforward, some tips to make testing go more smoothly are offered in Table 59.

Table 58: Dye Testing Options

Product	Applications
Dye Tablets	• Compressed powder, useful for releasing dye over time • Less messy than powder form • Easy to handle, no mess, quick dissolve • Flow mapping and tracing in storm and sewer drains • Plumbing system tracing • Septic system analysis • Leak detection
Liquid Concentrate	• Very concentrated, disperses quickly • Works well in all volumes of flow • Recommended when metering of input is required • Flow mapping and tracing in storm and sewer drains • Plumbing system tracing • Septic system analysis • Leak detection
Dye Strips	• Similar to liquid but less messy
Powder	• Can be very messy and must dissolve in liquid to reach full potential • Recommended for very small applications or for very large applications where liquid is undesirable • Leak detection
Dye Wax Cakes	• Recommended for moderate-sized bodies of water • Flow mapping and tracing in storm and sewer drains
Dye Wax Donuts	• Recommended for large sized bodies of water (lakes, rivers, ponds) • Flow mapping and tracing in storm and sewer drains • Leak detection

Table 59: Tips for Successful Dye Testing
(Adapted from Tuomari and Thompson, 2002)

Dye Selection
- Green and liquid dyes are the easiest to see.
- Dye test strips can be a good alternative for residential or some commercial applications. (Liquid can leave a permanent stain).
- Check the sanitary sewer before using dyes to get a "base color." In some cases, (e.g., a print shop with a permitted discharge to the sanitary sewer), the sewage may have an existing color that would mask a dye.
- Choose two dye colors, and alternate between them when testing multiple fixtures.

Selecting Fixtures to Test
- Check the plumbing plan for the site to isolate fixtures that are separately connected.
- For industrial facilities, check most floor drains (these are often misdirected).
- For plumbing fixtures, test a representative fixture (e.g., a bathroom sink).
- Test some locations separately (e.g., washing machines and floor drains), which may be misdirected.
- If conducting dye investigations on multiple floors, start from the basement and work your way up.
- At all fixtures, make sure to flush with plenty of water to ensure that the dye moves through the system.

Selecting a Sewer Manhole for Observations
- Pick the closest manhole possible to make observations (typically a sewer lateral).
- If this is not possible, choose the nearest downstream manhole.

Communications Between Crew Members
- The individual conducting the dye testing calls in to the field person to report the color dye used, and when it is dropped into the system.
- The field person then calls back when dye is observed in the manhole.
- If dye is not observed (e.g., after two separate flushes have occurred), dye testing is halted until the dye appears.

Locating Missing Dye
- The investigation is not complete until the dye is found. Some reasons for dye not appearing include:
- The building is actually hooked up to a septic system.
- The sewer line is clogged.
- There is a leak in the sewer line or lateral pipe.

Video Testing

Video testing works by guiding a mobile video camera through the storm drain pipe to locate the actual connection producing an illicit discharge. Video testing shows flows and leaks within the pipe that may indicate an illicit discharge, and can show cracks and other pipe damage that enable sewage or contaminated water to flow into the storm drain pipe.

Video testing is useful when access to properties is constrained, such as residential neighborhoods. Video testing can also be expensive, unless the community already owns and uses the equipment for sewer inspections. This technique will not detect all types of discharges, particularly when the illicit connection is not flowing at the time of the video survey.

Different types of video camera equipment are used, depending on the diameter and condition of the storm sewer being tested.

Field crews should review storm drain maps, and preferably visit the site before selecting the video equipment for the test. A field visit helps determine the camera size needed to fit into the pipe, and if the storm drain has standing water.

In addition to standard safety equipment required for all manhole inspections, video testing requires a Closed-Circuit Television (CCTV) and supporting items. Many commercially available camera systems are specifically adapted to televise storm sewers, ranging from large truck or van-mounted systems to much smaller portable cameras. Cameras can be self-propelled or towed. Some specifications to look for include:

- The camera should be capable of radial view for inspection of the top, bottom, and sides of the pipe and for looking up lateral connections.
- The camera should be color.
- Lighting should be supplied by a lamp on the camera that can light the entire periphery of the pipe.

When inspecting the storm sewer, the CCTV is oriented to keep the lens as close as possible to the center of the pipe. The camera can be self-propelled through the pipe using a tractor or crawler unit or it may be towed through on a skid unit (see Figures 65 and 66). If the storm drain has ponded water, the camera should be attached to a raft, which floats through the storm sewer from one manhole to the next. To see details of the sewer, the camera and lights should be able to swivel both horizontally and vertically. A video record of the inspection should be made for future reference and repairs (see Figure 67).



Figure 65: Camera being towed

Smoke Testing

Smoke testing is another "bottom up" approach to isolate illicit discharges. It works by introducing smoke into the storm drain system and observing where the smoke surfaces. The use of smoke testing to detect illicit discharges is a relatively new application, although many communities have used it to check for infiltration and inflow into their sanitary sewer network. Smoke testing can find improper



Figure 66: Tractor-mounted camera



Figure 67: Review of an inspection video

connections, or damage to the storm drain system (Figure 68). This technique works best when the discharge is confined to the upper reaches of the storm drain network, where pipe diameters are to small for video testing and gaining access to multiple properties renders dye testing infeasible.

Notifying the public about the date and purpose of smoke testing before starting is critical. The smoke used is non-toxic, but can cause respiratory irritation, which can be a problem for some residents. Residents should be notified at least two weeks prior to testing, and should be provided the following information (Hurco Technologies, Inc., 2003):

- Date testing will occur
- Reason for smoke testing
- Precautions they can take to prevent smoke from entering their homes or businesses
- What they need to do if smoke enters their home or business, and any health concerns associated with the smoke
- A number residents can call to relay any particular health concerns (e.g., chronic respiratory problems)

Program managers should also notify local media to get the word out if extensive smoke testing is planned (e.g., television, newspaper, and radio). On the actual day of testing, local fire, police departments and 911 call centers should be notified to handle any calls from the public (Hurco Technologies, Inc., 2003).

The basic equipment needed for smoke testing includes manhole safety equipment, a smoke source, smoke blower, and sewer plugs. Two smoke sources can be used for smoke testing. The first is a smoke "bomb," or "candle" that burns at a controlled rate and releases very white smoke visible at relatively low concentrations (Figure 69). Smoke bombs are suspended beneath a blower in a manhole. Candles are available in 30 second to three minute sizes. Once opened, smoke bombs should be kept in a dry location and should be used within one year.

The second smoke source is liquid smoke, which is a petroleum-based product that is injected into the hot exhaust of a blower where it is heated and vaporized (Figure 70). The length of smoke production can vary depending on the length of the pipe being

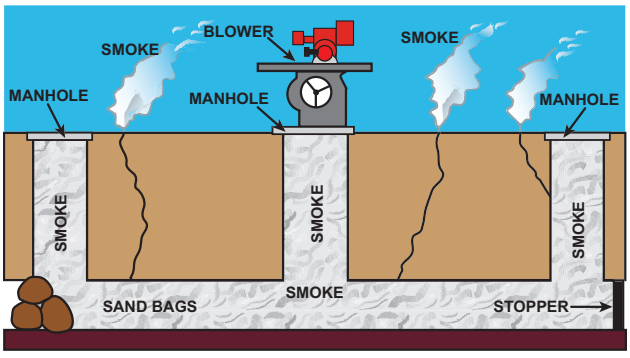


Figure 68: Smoke Testing System Schematic



Figure 69: Smoke Candles



Figure 70: Smoke blower

tested. In general, liquid smoke is not as consistently visible and does not travel as far as smoke from bombs (USA Blue Book).

Smoke blowers provide a high volume of air that forces smoke through the storm drain pipe. Two types of blowers are commonly used: "squirrel cage" blowers and direct-drive propeller blowers. Squirrel cage blowers are large and may weigh more than 100 pounds, but allow the operator to generate more controlled smoke output. Direct-drive propeller blowers are considerably lighter and more compact, which allows for easier transport and positioning.

Three basic steps are involved in smoke testing. First, the storm drain is sealed off by plugging storm drain inlets. Next, the smoke is released and forced by the blower through the storm drain system. Lastly, the crew looks for any escape of smoke above-ground to find potential leaks.

One of three methods can be used to seal off the storm drain. Sandbags can be lowered into place with a rope from the street surface. Alternatively, beach balls that have a diameter slightly larger than the drain can be inserted into the pipe. The beach ball is then placed in a mesh bag with a rope attached to it so it can be secured and retrieved. If the beach ball gets stuck in the pipe, it can simply be punctured, deflated and removed. Finally, expandable plugs are available, and may be inserted from the ground surface.

Blowers should be set up next to the open manhole after the smoke is started. Only one manhole is tested at a time. If smoke candles are used, crews simply light the candle, place it in a bucket, and lower it in the manhole. The crew then watches to see where smoke escapes from the pipe. The two most common situations that indicate an illicit discharge are when smoke is seen rising from internal plumbing fixtures (typically reported by residents) or from sewer vents. Sewer vents extend upward from the sewer lateral to release gas buildup, and are not supposed to be connected to the storm drain system.

13.4 Septic System Investigations

The techniques for tracing illicit discharges are different in rural or low-density residential watersheds. Often, these watersheds lack sanitary sewer service and storm water is conveyed through ditches or swales, rather than enclosed pipes. Consequently, many illicit discharges enter the stream as indirect discharges, through surface breakouts of septic fields or through straight pipe discharges from bypassed septic systems.

The two broad techniques used to find individual septic systems—on-site investigations and infrared imagery—are described in this section.

On-Site Septic Investigations

Three kinds of on-site investigations can be performed at individual properties to determine if the septic system is failing, including homeowner survey, surface condition analysis and a detailed system inspection. The first two investigations are rapid and relatively simple assessments typically conducted in targeted watershed areas. Detailed system inspections are a much more thorough investigation of the functioning of the septic system that is conducted by a certified professional. Detailed system inspections may occur at time of sale of a property, or be triggered by poor scores on the rapid homeowner survey or surface condition analysis.

Homeowner Survey

The homeowner survey consists of a brief interview with the property owner to determine the potential for current or future failure of the septic system, and is often done in conjunction with a surface condition analysis.

Table 60 highlights some common questions to ask in the survey, which inquire about resident behaviors, system performance and maintenance activity.

Surface Condition Analysis

The surface condition analysis is a rapid site assessment where field crews look for obvious indicators that point to current or potential production of illicit discharges by the septic system (Figure 71). Some of the key surface conditions to analyze have been described by Andrews *et al*., (1997) and are described below:

- Foul odors in the yard
- Wet, spongy ground; lush plant growth; or burnt grass near the drain field
- Algal blooms or excessive weed growth in adjacent ditches, ponds and streams
- Shrubs or trees with root damage within 10 feet of the system
- Cars, boats, or other heavy objects located over the field that could crush lateral pipes
- Storm water flowing over the drain field
- Cave-ins or exposed system components
- Visible liquid on the surface of the drain field (e.g., surface breakouts)
- Obvious system bypasses (e.g., straight pipe discharges)

Table 60: Septic System Homeowner Survey Questions
(Adapted from Andrews et al., 1997 and Holmes Inspection Services)

- How many people live in the house?[1]
- What is the septic tank capacity?[2]
- Do drains in the house empty slowly or not at all?
- When was the last time the system was inspected or maintained?
- Does sewage back up into the house through drain lines?
- Are there any wet, smelly spots in the yard?
- Is the septic tank effluent piped so it drains to a road ditch, a storm sewer, a stream, or is it connected to a farm drain tile?

[1] Water usage ranges from 50 to 100 gallons per day per person. This information can be used to estimate the wastewater load from the house (Andrews et. al, 1997).
[2] The septic tank should be large enough to hold two days' worth of wastewater (Andrews et. al, 1997).

a.  b. 

Figure 71: (a) Straight pipe discharge to nearby stream. (b) Algal bloom in a nearby pond.
(Sources: a- Snohomish County, WA, b- King County, WA)

Detailed System Inspection

The detailed system inspection is a much more thorough inspection of the performance and function of the septic system, and must be completed by a certified professional. The inspector certifies the structural integrity of all components of the system, and checks the depth of solids in the septic tank to determine if the system needs to be pumped out. The inspector also sketches the system, and estimates distance to groundwater, surface water, and drinking water sources. An example septic system inspection form from Massachusetts can be found at http://www.state.ma.us/dep/brp/wwm/soilsys.htm.

Although not always incorporated into the inspection, dye testing can sometimes point to leaks from broken pipes, or direct discharges through straight pipes that might be missed during routine inspection. Dye can be introduced into plumbing fixtures in the home, and flushed with sufficient running water. The inspector then watches the septic field, nearby ditches, watercourses and manholes for any signs of the dye. The dye may take several hours to appear, so crews may want to place charcoal packets in adjacent waters to capture dye until they can return later to retrieve them.

Infrared Imagery

Infrared imagery is a special type of photography with gray or color scales that represent differences in temperature and emissivity of objects in the image (www.stocktoninfrared.com), and can be used to locate sewage discharges. Several different infrared imagery techniques can be used to identify illicit discharges. The following discussion highlights two of these: aerial infrared thermography[13] and color infrared aerial photography.

Infrared Thermography

Infrared thermography is increasingly being used to detect illicit discharges and failing septic systems. The technique uses the temperature difference of sewage as a marker to locate these illicit discharges. Figure 72 illustrates the thermal difference

[13] Infrared thermography is also being used by communities such as Mecklenburg County and the City of Charlotte in NC to detect illicit discharges at outfalls.

between an outfall discharge (with a higher temperature) and a stream.

The equipment needed to conduct aerial infrared thermography includes an aircraft (plane or helicopter); a high-resolution, large format, infrared camera with appropriate mount; a GPS unit; and digital recording equipment. If a plane is used, a higher resolution camera is required since it must operate at higher altitudes. Pilots should be experienced since flights take place at night, slowly, and at a low altitude. The camera may be handheld, but a mounted camera will provide significantly clearer results for a larger area. The GPS can be combined with a mobile mapping program and a video encoder-decoder that encodes and displays the coordinates, date, and time (Stockton, 2000). The infrared data are analyzed after the flight by trained analysts to locate suspected discharges, and field crews then inspect the ground-truthed sites to confirm the presence of a failing septic system.

Late fall, winter, and early spring are typically the best times of year to conduct these investigations in most regions of the country. This allows for a bigger difference between receiving water and discharge temperatures, and interference from vegetation is minimized (Stockton, 2004b). In addition, flights should take place at night to minimize reflected and direct daylight solar radiation that may adversely affect the imagery (Stockton, 2004b).



Figure 72: Aerial thermography showing sewage leak

Color Infrared Aerial Photography

Color infrared aerial photography looks for changes in plant growth, differences in soil moisture content, and the presence of standing water on the ground to primarily identify failing septic systems (Figure 73).

The Tennessee Valley Authority (TVA) uses color infrared aerial photography to detect failing septic systems in reservoir watersheds. Local health departments conduct follow-up ground-truthing surveys to determine if a system is actually failing (Sagona, 1986). Similar to thermography, it is recommended that flights take place at night, during leaf-off conditions, or when the water table is at a seasonal high (which is when most failures typically occur (U.S. EPA, 1999).



Figure 73: Dead vegetation and surface effluent are evidence of a septic system surface failure.
(Source: U.S. EPA, 1999)

13.5 The Cost to Trace Illicit Discharge Sources

Tracing illicit discharges to their source can be an elusive and complex process, and precise staffing and budget data are difficult to estimate. Experience of Phase I NPDES communities that have done these investigations in the past can shed some light on cost estimates. Some details on unit costs for common illicit discharge investigations are provided below.

Costs for Dye, Video, and Smoke Testing

The cost of smoke, dye, and video testing can be substantial and staff intensive, and often depend on investigation specific factors, such as the complexity of the drainage network, density and age of buildings, and complexity of land use. Wayne County, MI, has estimated the cost of dye testing at $900 per facility. Video testing costs range from $1.50 to $2.00 per foot, although this increases by $1.00 per foot if pipe cleaning is needed prior to testing.

Table 61 summarizes the costs of start-up equipment for basic manhole entry and inspection, which is needed regardless of which type of test is performed. Tables 62 through 64 provide specific equipment costs for dye, video and smoke testing, respectively.

Table 61: Common Field Equipment Needed for Dye, Video, and Smoke Testing

Item	Cost
1 Digital Camera	$200
Clipboards, Pens, Batteries	$25
1 Field vehicle	$15,000 - $35,000
1 First aid kit	$30
1 Spotlight	$40
1 Gas monitor and probe	$900 - $2,100
1 Hand-held GPS Unit	$150
2 Two-way radios	$250 - $750
1 Manhole hook	$80 - $130
1 Mirror	$70 - $130
2 Reflective safety vests	$40
Rubber/latex gloves (box of 100)	$25
1 Can of Spray Paint	$5
4 Traffic Cones	$50

Table 62: Equipment Costs for Dye Testing		
Product	**Water Volume**	**Cost**
Dye Strips	1 strip/500 gallons	$75 – $94 per 100 strips
Dye Tablets	0 – 50,000 gallons	$40 per 200 tablets
Liquid Concentrate (Rhodamine WT)	0 – 50,000 gallons	$80 – $90 per gallon $15 – $20 per pint
Powder	50,000 + gallons	$77 per lb
Dye Wax Cakes	20,000 – 50,000 gallons	$12 per one 1.25 ounce cake
Dye Wax Donuts	50,000 + gallons	$104 – $132 per 42 oz. donut
Price Sources: *Aquatic Eco-Systems http://www.aquaticeco.com/* *Cole Parmer http:/www.coleparmer.com* *USA Blue Book http:/www.usabluebook.com*		

Table 63: Equipment Costs for Video Testing	
Equipment	**Cost**
GEN-EYE 2™ B&W Sewer Camera with VCR & 200' Push Cable	$5,800
100' Push Rod and Reel Camera for 2" – 10" Pipes	$5,300
200' Push Rod and Reel Camera for 8" – 24" Pipes	$5,800
Custom Saturn III Inspection System 500' cable for 6-16" Lines	$32,000 ($33,000 with 1000 foot cable)
OUTPOST • Box with build-out • Generator • Washdown system	 $6,000 $2,000 $1,000
Video Inspection Trailer • 7'x10' trailer & build-out • Hardware and software package • Incidentals	 $18,500 $15,000 $5,000
Sprinter Chassis Inspection Vehicle • Van (with build-out for inspecting 6" – 24" pipes) • Crawler (needed to inspect pipes >24") • Software upgrade (optional but helpful for extensive pipe systems)	 $130,000 $18,000 $8,000
Sources: USA Blue Book and Envirotech	

Table 64: Equipment Costs for Smoke Testing	
Equipment	**Cost**
Smoke Blower	$1,000 to $2,000 each
Liquid Smoke	$38 to $45 per gallon
Smoke Candles, 30 second (4,000 cubic feet)	$27.50 per dozen
Smoke Candles, 60 Second (8,000 cubic feet)	$30.50 per dozen
Smoke Candles, 3 Minute (40,000 cubic feet)	$60.00 per dozen
Sources: Hurco Tech, 2003 and Cherne Industries, 2003	

Costs for Septic System Investigations

Most septic system investigations are relatively low cost, but factors such as private property access, notification, and the total number of sites investigated can increase costs. Unit costs for the three major septic system investigations are described below.

Homeowner Survey and Surface Condition Analysis

Both the homeowner survey and the surface condition analysis are relatively low cost investigation techniques. Assuming that a staff person can investigate one home per hour, the average cost per inspection is approximately $25. A substantial cost savings can be realized by using interns or volunteers to conduct these simple investigations.

Detailed System Inspection

Septic system inspections are more expensive, but a typical unit cost is about $250, and may also include an additional cost of pumping the system, at roughly $150, if pumping is required to complete the inspection (Wayne County, 2003). This cost is typically charged to the homeowner as part of a home inspection.

Aerial Infrared Thermography

The equipment needed to conduct aerial infrared thermography is expensive; cameras alone may range from $250,000 to $500,000 (Stockton, 2004a). However, private contractors provide this service. In general, the cost to contract an aerial infrared thermography investigation depends on the length of the flight (flights typically follow streams or rivers); how difficult it will be to fly the route; the number of heat anomalies expected to be encountered; the expected post-flight processing time (typically, four to five hours of analysis for every hour flown); and the distance of the site from the plane's "home" (Stockton, 2004a). The cost range is typically $150 to $400 per mile of stream or river flown, which includes the flight and post-flight analyses (Stockton, 2004a).

As an alternative, local police departments may already own an infrared imaging system that may be used. For instance, the Arkansas Department of Health used a state police helicopter with a Forward Looking Infrared (FLIR) imaging system, GPS, video equipment, and maps (Eddy, 2000). The disadvantage to this is that the equipment may not be available at optimal times to conduct the investigation. In addition, infrared imaging equipment used by police departments may not be sensitive enough to detect the narrow range of temperature difference (only a few degrees) often expected for sewage flows (Stockton, 2004a).

EPA New England Bacterial Source Tracking Protocol
Draft – January 2012

Purpose

This document provides a common framework for EPA New England ("EPA-NE") staff to develop and implement bacterial source tracking sample events, and provides a recommended approach to watershed association, municipal, and State personnel. Adopted from Boston Water and Sewer Commission ("BWSC") (2004), Pitt (2004), and based upon fieldwork conducted and data collected by EPA-NE, the protocol relies primarily on visual observations and the use of field test kits and portable instrumentation during dry and wet weather to complete a screening-level investigation of stormwater outfall discharges or flows within the drainage system. When necessary, the addition of more conclusive chemical markers may be included. The protocol is applicable to most typical Municipal Separate Storm Sewer Systems ("MS4s") and smaller tributary streams. The smaller the upstream catchment area and/or more concentrated the flow, the greater the likelihood of identifying an upstream wastewater source.

Introduction

The protocol is structured into several phases of work that progress through investigation planning and design, laboratory coordination, sample collection, and data evaluation. The protocol involves the concurrent collection and analyses of water samples for surfactants, ammonia, total chlorine, and bacteria. When more precise confirmation regarding the presence or absence of human sanitary sewage is necessary, and laboratory capacity is available, the additional concurrent collection of samples for select Pharmaceutical and Personal Care Product ("PPCP") analysis is advised. When presented with a medium to large watershed or numerous stormwater outfalls, the recommended protocol is the screening of all outfalls using the surfactant, ammonia, total chlorine, and bacterial analyses, in addition to a thorough visual assessment. The resulting data and information should then be used to prioritize and sample a subset of outfalls for all parameters, including PPCP compounds and additional analyses as appropriate. Ideally, screening-level analyses can be conducted by state, municipal, or local watershed association personnel, and a prioritized sub-set of outfalls can be sampled through a commercial laboratory or by EPA-NE using more advanced confirmatory techniques.

Step I – Reconnaissance and Investigation Design

Each sample event should be designed to answer a specific problem statement and work to identify the source of contamination. Any relevant data or reports from State, municipal, or local watershed associations should be reviewed when selecting sample locations. Aerial photography, mapping services, or satellite imagery resources are available free to the public through the internet, and offer an ideal way to pre-select locations for either field verification or sampling.

Sample locations should be selected to segregate outfall sub-catchment areas or surface waters into meaningful sections. A common investigative approach would be the identification of a

specific reach of a surface water body that is known to be impaired for bacteria. Within this specific reach, stormwater outfalls and smaller tributary streams would be identified by desktop reconnaissance, municipal outfall mapping, and field investigation when necessary. Priority outfalls or areas to field verify the presence of outfalls should be selected based on a number of factors, including but not limited to the following: those areas with direct discharges to critical or impaired waters (e.g. water supplies, swimming beaches); areas served by common/twin-invert manholes or underdrains; areas with inadequate levels of sanitary sewer service, Sanitary Sewer Overflows ("SSOs") or the subject of numerous/chronic sanitary sewer customer complaints; formerly combined sewer areas that have been separated; culverted streams, and; outfalls in densely populated areas with older infrastructure. Pitt (2004) provides additional detailed guidance.

When investigating an area for the first time, the examination of outfalls in dry-weather is recommended to identify those with dry-weather flow, odor, and the presence of white or gray filamentous bacterial growth that is common (but not exclusively present) in outfalls contaminated with sanitary. For those outfalls with dry-weather flow and no obvious signs of contamination, one should never assume the discharge is uncontaminated. Sampling by EPA-NE staff has identified a number of outfalls with clear, odorless discharges that upon sampling and analyses were quite contaminated. Local physical and chemical conditions, in addition to the numerous causes of illicit discharges, create outfall discharges that can be quite variable in appearance. Outfalls with no dry-weather flow should be documented, and examined for staining or the presence of any obvious signs of past wastewater discharges downstream of the outfall.

As discussed in BWSC (2004), the protocol may be used to sample discreet portions of an MS4 sub-catchment area by collecting samples from selected junction manholes within the stormwater system. This protocol expands on the BWSC process and recommends the concurrent collection of bacteria, surfactant, ammonia, and chlorine samples at each location to better identify and prioritize contributing sources of illicit discharges, and the collection of PPCP compounds when more conclusive source identification is necessary.

Finally, as discussed further in Step IV, application of this sampling protocol in wet-weather is recommended for most outfalls, as wet-weather sampling data may indicate a number of illicit discharge situations that may not be identified in dry weather.

Step II – Laboratory Coordination

All sampling should be conducted in accordance with a Quality Assurance Project Plan ("QAPP"). A model QAPP is included as Attachment 1. While the QAPP details sample collection, preservation, and quality control requirements, detailed coordination with the appropriate laboratory staff will be necessary. Often sample events will need to be scheduled well in advance. In addition, the sampling team must be aware of the strict holding time requirements for bacterial samples – typically samples analysis must begin within 6 hours of sample collection. For sample analyses conducted by a commercial laboratory, appropriate coordination must occur to determine each facilities respective procedures and requirements.

The recommendations in this protocol are based on the use of a currently unpublished EPA-NE modification to *EPA Method 1694 – Pharmaceuticals and Personal Care Products in Water, Soil, Sediment, and Biosolids by HPLC/MS/MS*. Several commercial laboratories may offer Method 1694 capability. EPA-NE recommends those entities wishing to utilize a contract laboratory for PPCP analyses ensure that the laboratory will provide quantitative analyses for acetaminophen, caffeine, cotinine, carbamazepine, and 1,7-dimethylexanthine, at Reporting Limits similar to those used by EPA-NE (See Attachment 2). Currently, the EPA-NE laboratory has limited capacity for PPCP sampling, and any proposed EPA-NE PPCP sample events must be coordinated well in advance with the appropriate staff.

Step III – Sample Collection

Once a targeted set of outfalls has been selected, concurrent sampling and analyses for surfactants, ammonia, and total chlorine (which can all be done through the use of field kits), in addition to bacteria (via laboratory analysis) should be conducted. When numerous outfalls with dry-weather flow exist, sample locations should be prioritized according to the criteria mentioned above. In addition, field screening using only the field kits may occur during the field reconnaissance. However, it must be emphasized that the concurrent sampling and analyses of bacteria, surfactant, ammonia, and total chlorine parameters is the most efficient and cost-effective screening method.

When first observed, the physical attributes of each outfall or sampling location should be noted for construction materials, size, flow volume, odor, and all other characteristics listed on the data collection form (Attachment 3). In addition, GPS coordinates should be collected and a photograph of the sample location taken. Whenever possible, the sampling of storm drain outfalls should be conducted as close to the outfall opening as possible. Bacterial samples should be collected first, with care to not disturb sediment materials or collect surface debris/scum as best possible. A separate bottle is used to collect a single water sample from which aliquots will be analyzed for surfactants, ammonia, and total chlorine. A sample for PPCP analysis is recommended to be collected last, as the larger volume required and larger bottle size may cause some sediment disturbance in smaller outfalls or streams. If necessary, a second smaller, sterile and pre-cleaned sampling bottle may be used to collect the surface water which can then be poured into the larger PPCP bottle. Last, a properly calibrated temperature/specific conductance/salinity meter should be used to record all three parameters directly from the stream or outfall. When flow volume or depth is insufficient to immerse the meter probe, a clean sample bottle may be utilized to collect a sufficient volume of water to immerse the probe. In such instances, meter readings should be taken immediately.

As soon as reasonably possible, sample aliquots from the field kit bottle should be analyzed. When concurrent analyses are not possible, ammonia and chlorine samples should be processed first, followed by surfactant analysis, according to each respective Standard Operating Procedure as appropriate based on the particular brand and type of field test kit being used. All waste from the field test kits should be retained and disposed of according to manufacture instructions. Where waste disposal issues would otherwise limit the use of field kits, EPA-NE recommends

that, at a minimum, ammonia test strips with a Reporting Limit below 0.5 mg/L be utilized. Such test strips typically are inexpensive and have no liquid reagents associated with their use. Results should be recorded, samples placed in a cooler on ice, and staff should proceed to the next sample location.

Upon completion of sampling and return to the laboratory, all samples will be turned over to the appropriate sample custodian(s) and accompanied by an appropriate Chain-of-Custody ("COC") form.

Step IV – Data Evaluation

Bacterial results should be compared to the applicable water quality standards. Surfactant and ammonia concentrations should be compared to the thresholds listed in Table 1. Evaluation of the data should include a review for potential positive results due to sources other than human wastewater, and for false negative results due to chemical action or interferences. In the EPA-NE region, field sampling has indicated that the biological breakdown of organic material in historically filled tidal wetlands may cause elevated ammonia readings, as can the discharge from many landfills. In addition, salinity levels greater than 1 part per thousand may cause elevated surfactant readings, the presence of oil may likewise indicate elevated levels, and fine suspended particulate matter may cause inconclusive surfactant readings (for example, the indicator ampule may turn green instead of a shade of blue). Finally, elevated chlorine from leaking drinking water infrastructure or contained in the illicit wastewater discharge may inhibit bacterial growth and cause very low bacterial concentrations. Any detection of total chlorine above the instrument Reporting Limit should be noted.

Table 1 – Freshwater Water Quality Criteria, Threshold Levels, and Example Instrumentation [1]

Analyte/ Indicator	**Threshold Levels/ Single Sample[3]**	**Instrumentation**
E. coli [2]	235 cfu/100ml	Laboratory via approved method
Enterococci [2]	61 cfu/100ml	Laboratory via approved method
Surfactants (as MBAS)	$\geq$ 0.25 mg/l	MBAS Test Kit (e.g. CHEMetrics K-9400)
Ammonia (NH_3)	$\geq$ 0 .5 mg/l	Ammonia Test Strips (e.g. Hach brand)
Chlorine	> Reporting Limit	Field Meter (e.g. Hach Pocket Colorimeter II)
Temperature	See Respective State Regulations	Temperature/Conductivity/Salinity Meter (e.g. YSI Model 30)

[1] The mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. EPA

[2] 314 CMR 4.00 MA - Surface Water Quality Standards - Class B Waters.

[3] Levels that may be indicative of potential wastewater or washwater contamination

Once dry-weather data has been examined and compared to the appropriate threshold values, outfalls or more discreet reaches of surface water can be selected for sampling or further investigation. Wet-weather sampling is also recommended for all outfalls, in particular for those that did not have flow in dry weather or those with dry-weather flow that passed screening thresholds. Wet-weather sampling will identify a number of situations that would otherwise pass unnoticed in dry weather. These wet-weather situations include, but are not limited to the following: elevated groundwater that can now cause an exchange of wastewater between cracked or broken sanitary sewers, failed septic systems, underdrains, and storm drains; increased sewer volume that can exfiltrate through cracks in the sanitary piping; increased sewer volume that can enter the storm drain system in common manholes or directly-piped connections to storm drains; areas subject to capacity-related SSO discharges, and; illicit connections that are not carried through the storm drain system in dry-weather.

Step V – Costs

Use of field test kits and field instruments for a majority of the analytical parameters allows for a significantly reduced analytical cost. Estimated instrument costs and pro-rated costs per 100 samples are included in Table 2. The cost per 100 samples metric allows averaged costs to account for reagent refills that are typically less expensive as they do not include the instrument cost, and to average out the initial capital cost for an instrument such as a temperature/ conductivity/salinity meter. For such capital costs as the meters, the cost over time will continue to decrease.

Table 2 – Estimated Field Screening Analytical Costs [1]

Analyte/ Indicator	Instrument or Meter [2]	Instrument or Meter Cost/No. of Samples	Cost per Sample (Based on 100 Samples) [3]
Surfactants (as MBAS)	Chemetrics K-9400	$77.35/20 samples ($58.08/20 sample refill)	$3.09
Ammonia (NH_3)	Hach brand 0 – 6 mg/l	$18.59/25 samples	$0.74
Total Chlorine	Hach Pocket Colorimeter II	$389/100 samples ($21.89 per 100 sample refill)	$3.89
Temperature/ Conductivity/ Salinity	YSI	$490 (meter and cable probe)	$4.90

1 Estimated costs as of February 2011

2 The mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. EPA

3 One-time meter costs and/or refill kits will reduce sample costs over time

From Table 2, the field analytical cost is approximately $13 per outfall. Typical bacterial analyses costs can vary depending on the analyte, method, and total number of samples to be

performed by the laboratory. These bacterial analyses costs can range from $20 to $60. Therefore, the analytical cost for a single outfall, based on the cost per 100 samples, ranges from $33 to $73. As indicated above, these costs will decrease slightly over time due to one-time capitals costs for the chlorine and temperature/conductivity/salinity meters.

Step VI – Follow-Up

Once all laboratory data has been reviewed and determined final in accordance with appropriate quality assurance controls, results should be reviewed with appropriate stakeholders to determine next steps. Those outfalls or surface water segments that fail to meet the appropriate water quality standard, and meet or exceed the surfactant and ammonia threshold values, in the absence of potential interferences mentioned in Step IV, indicate a high likelihood for the presence of illicit connections upstream in the drainage system or surface water. Whereas illicit discharges are quite variable in nature, the exceedance of the applicable water quality standard and only the ammonia or surfactant threshold value may well indicate the presence of an illicit connection. When available, the concurrent collection and analyses of PPCP data can greatly assist in confirming the presence of human wastewater. However, such data will not be available in all instances, and the collective data set and information regarding the physical characteristics of each sub-catchment or surface water reach should be used to prioritize outfalls for further investigation. As warranted, data may be released to the appropriate stakeholders, and should be accompanied by an explanation of preliminary findings. Release of EPA data should be fully discussed with the case team or other appropriate EPA staff.

References Cited

Boston Water & Sewer Commission, 2004, *A systematic Methodology for the Identification and Remediation of Illegal Connections.* 2003 Stormwater Management Report, chap. 2.1.

Pitt, R. 2004 *Methods for Detection of Inappropriate Discharge to Storm Drain Systems. Internal Project Files*. Tuscaloosa, AL, *in* The Center for Watershed Protection and Pitt, R., *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*: Cooperative Agreement X82907801-0, U.S. Environmental Protection Agency, variously paged. Available at: http://www.cwp.org.

Instrumentation Cited (Manufacturer URLs)

MBAS Test Kit - CHEMetrics K-9400: http://www.chemetrics.com/Products/Deterg.htm

Portable Colorimeter – Hach Pocket Colorimeter II: http://www.hach.com/

Ammonia (Nitrogen) Test Strips: http://www.hach.com/

Portable Temperature/Conductivity/Salinity Meter: YSI Model 30: http://www.ysi.com/productsdetail.php?30-28

Disclaimer: The mention of trade names or commercial products in this protocol does not constitute endorsement or recommendation for use by the U.S. EPA.

Stormwater Monitoring Quality Assurance Project Plan
2012-2017

RFA #

Sampling Plan Acceptance

EPA OES Enforcement and Project Manager/Coordinator **Signature:**	**Date:**
EPA OEME Project Managers/Coordinator **Signature:**	**Date:**
EPA OEME QA Officer **Signature:**	**Date:**
EPA Chemistry Team Lead **Signature:**	**Date:**

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1.0 Background

U.S. EPA Administrative Order 5360.1 requires that "all projects involving environmental monitoring performed by or for the U.S. EPA shall not be undertaken without an adequate Quality Assurance Project Plan (QAPP)." The purpose of this document is to describe the process used to develop, select, manage, and finalize stormwater monitoring projects. In describing this process, quality assurance goals and methods will be established, thus ensuring that the overall program and each monitoring project will meet or exceed EPA requirements for quality assurance.

The objective of these projects will be to collect data that is usable by EPA OES enforcement staff for enforcement actions and information requests. The primary focus of this project will be on urban water stormwater outfalls in the New England Region watersheds.

2.0 Sampling overview

Monitoring will be conducted on pre-scheduled days with the Laboratory. Samples will be retrieved from surface water, in stream or outfalls at suspected hotspots or areas that need further delineation. Sample sites will be located using GPS, with an accuracy goal of $\pm$ 1 meter and PDOP less than 6. Less accurate GPS reading or coordinates from maps will be accepted when site or other conditions do not allow $\pm$ 1 meter accuracy.

The primary focus of this sampling will be used to identify illegal discharges.
Results from the sampling will be used by EPA enforcement staff for enforcement purposes. For this project, sampling will be conducted according to EPA's Ambient Water Sampling SOP (Table 3). Volunteers and watershed association staff may assist in sampling. All procedures will be followed that are specified in Table 3. Parameter to be sampled will be predetermined by enforcement (OES) and OEME staff, based on data needs.

A. Locations

Site locations will be determined from field or desktop reconnaissance by project staff. Sample analyses will be predetermined based on conditions known about the sampling location prior to sampling. These may include data from previous sampling or from data collected from Mass DEP or local watershed associations. Any of the parameters listed in table 2 may be analyzed.

B. Analytical Methods and Reporting limits

Sample analyses will be conducted by EPA Laboratories.

This effort will test and compare the most appropriate analytical methods including, but not limited to; laboratory analysis, test kits and field analysis to determine the most effective and cost-efficient outfall and in-stream sampling approach.
Multiple and repeated testing will occur at each location to compare different method for identifying sewage contamination.

PPCPs, E.coli and enterococcus will be analyzed by EPA's Laboratory. Surfactants, ammonia, total chlorine will be analyzed with field test kits. Potential additional laboratory analyses include nitrogen (nitrate/nitrite), TSS, BOD, surfactants, ammonia and TPH. The Laboratory used

DRAFT

for each sampling event will be determined prior to sampling by the OEME Project Manager based on required analyses Laboratory availability and contract funds available.

Where available, a known concentration sample will be used to evaluate the performance of each test method. The known concentration sample will be processed in the field and Laboratory as a routine sample. The analyst or field technician will not know the concentration of the sample prior to analyzing and reporting the sample result. Sampling for PPCP testing will be done using extreme care not to contaminate the sample. No caffeine products should be consumed prior to sampling.

Table 1: Parameter specifications

Parameter (lab - equipment)	Preservation	Holding time
PH	None	Immediate
Temperature	None	Immediate
Sp Cond	None	Immediate
DO	None	Immediate
Total Phosphorus (EPA)	H_2SO_4 (pH <2) + Ice	28 days
TSS (EPA)	Ice	7 days
TSS (Alpha)	Ice	7 days
BOD (Alpha)	Ice	48 hours
Surfactants (Alpha)	Ice	48 hours
Surfactants (field kit – Chemetrics)	None	Immediate
Ammonia (alpha)	H_2SO_4 (pH <2) + Ice	28 days
Ammonia (test strips)	None	Immediate
TPH Petroleum ID (alpha)	Ice	7 Days to extraction 40 days after extraction
E. Coli (EPA)	Ice	6 hrs to lab
Enterococcus (EPA)	Ice	6 hrs to lab
PPCP	Ice (acidified in Lab)	7 day to extraction 40 days after extraction
Chlorine (Field kit – Hach)	None	Immediate

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Table 2: Analytical References and Quality Control Goals

		Water Quality Criteria or Guidelines	Quality Assurance Goals		
Parameter (lab- equipment)	**Reporting Limits**	**(MA or EPA)**	**Precision**	**Accuracy**	**Completeness**
PH	4 to 10 units	6.5 - 8.3	0.02 unit	± 0.3 units	90%
Temperature	0 to +40°C	28.3°C	0.1 °C	± 0.15°C	90%
Sp Cond	0 to 100 mS/cm	NA	5 uS/cm	±10% cal std (µS/cm)	90%
DO	0.5mg/l to Sat	≥5 mg/l , ≥60% saturation	0.02mg/l	± .5 mg/l	90%
Total Phosphorus (EPA)	5.0 ug/l	NA	Field dup 30% RPD	MS 70-130%	90%
TSS (EPA)	5mg/L	NA	Field dup 30% RPD	See SOP	
TSS (Alpha)	5 mg/L	NA	Field dup 30% RPD	See SOP	90%
BOD (Alpha)	2 mg/L	NA	Field dup 30% RPD	See SOP	90%
Surfactants (field kit – Chemetrics)	0.25 mg/L[1]	0.25 mg/L	Field dup 30% RPD	TBD	90%
Ammonia (test strips)	0.25 mg/L[1]	1.0 mg/L	Field dup 30% RPD	TBD	90%
TPH Petroleum ID (alpha)	Variable	NA	Field dup 30% RPD	See SOP	
E. Coli (EPA)	4 col./ 100 ml	<=126 col./100 ml* <= 235 col./100 ml	±100 col/100ml or 30% RPD	N/A	90%
Enterococcus (EPA)	1 col/100ml	<=33 col./100 ml* <= 61 col./100 ml	±100 col/100ml or 30% RPD	See SOP	90%
PPCP	TBD	NA	Field dup 50% RPD	TBD	90%
Chlorine (Field kit – Hach)	0.02 mg/l	NA	Field dup 30% RPD	TBD	90%

Note
*Geometric mean Criteria
TBD = To be determined, Field methods and some colorimeter methods do not have accuracy criteria determined.
[1] Needs field verification to confirm

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Table 3: Field and Laboratory References

Parameter	Analytical Method Reference	SOP reference
	Field References- 5/2005	
pH		
Conductivity		
Temperature		
dissolved oxygen	n/a	ECASOP-YSISondes9
Ambient water samples	n/a	ECASop-Ambient Water Sampling2
Chain of custody of samples	n/a	EIASOP-CHAINOFCUST
Sample login, tracking, disposition	n/a	EIASOP-ADMLOG14
	Lab. References- 5/ 2005	
Total Phosphorus (EPA)	EPA 365.3	EIASOP-INGTP8
TSS (EPA)	EPA 160.2	EIASOP-INGTSS-TDS-VRES5
TSS (Alpha)	EPA 160.2,SM2540D	SOP/07-29
BOD (Alpha)	EPA 405.1,SM5210B	SOP/07-13
Surfactants (field kit – Chemetrics)	Chemetrics	Draft
Ammonia (test strips)	Hach	Draft
TPH Petroleum ID (alpha)	8015B (M)	0-017
E. Coli (EPA)	SM9230	ECASOP- TC/EC Colilert2
Enterococcus (EPA)	SM9230	ECASOP-Enterolert1
PPCP	EPA 1694	TBD
Chlorine (Field kit – Hach)	Hach	TBD

*Specific conductance is the only parameter identified as non critical

Bottle list

Table 4: Bottle Sampling List

Parameter (lab - equipment)	Bottle	Preservation
Primary analyses		
E. Coli (EPA)	(2) 120ml or 250ml sterile	Ice
Enterococcus (EPA)		Ice
PPCP	1 Liter Amber	Ice (acidified in Lab)
Optional analyses		
Chlorine (Alpha)	500 ml	Ice
Total Phosphorus (EPA)	125 ml	H_2SO_4 (pH <2) + Ice
TSS (EPA)	1 liter	Ice
TSS (Alpha)	1 liter	Ice
BOD (Alpha)	1 Liter	Ice
TPH Petroleum ID (alpha)	2 -1 Liter Amber Glass tephlon lined	Ice
E. Coli (Alpha)	120 ml sterile	Ice
Enterococcus (Alpha)	120 ml sterile	Ice

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C. Quality Control

Calibration:	EPA will calibrate its sondes according to the EPA sonde calibration SOP.
Field duplicate:	One duplicate sample will be collected per sampling event or approximately for every ten samples.
Trip Blank:	OEME Chemist will run appropriate QA samples for PPCP's. One blank sample will be collected for approximately every ten bacteria samples. Reported data that is less than 5 times the trip (field) blank concentration will be flagged.
QC Criteria:	Are specified in table 2, data not meeting this criteria will be reviewed by the Project Manager. Data that does not meet laboratory QA/QC criteria will be flagged by the laboratory.

D. Chain of Custody

Chain of custody procedures will follow the OEME/Investigations Office SOP (Table 3)

3.0 Data Review

EPA Microbiology data will be reviewed by the Biology QAO. Alpha generated microbiology samples will be reviewed by the OEME Project Manager. All field data and draft data reports will be reviewed by the OEME Project manager. Laboratory generated data (from Alpha and EPA) will be reviewed by the Chemistry Team Leader.

4.0 Data reports

Data reports will be reviewed by the Project Coordinator and the OEME Project Manager before a final report is release to the Enforcement Coordinator. Draft reports may be released without a complete review.

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5.0 Attachments

1) Standard Operating Procedure Enterococcus (SM9230B), Multiple Tube Technique. SOP/07-01 *Alpha Analytical, Inc. May 28, 2005*

2) Standard Operating Procedure E. Coli (SM9213D). SOP/07-41 *Alpha Analytical, Inc. May 28, 2005*

3) Standard Operating Procedure MBAS, Ionic Surfactants. Draft SOP *EPA Laboratory. January 28, 2010*

4) Standard Operating Procedure Nitrogen Ammonia. Draft SOP *EPA Laboratory. February 10, 2011*

5) Standard Operating Procedure Total Chlorine. Draft SOP *EPA Laboratory. February 12, 2010*

6) Standard Operating Procedure TSS/ TVSS (SM2540 D, EPA 160.2). SOP/07-29 *Alpha Analytical, Inc. September 29, 2007*

7) Standard Operating Procedure BOD-5day, SBOD-5day, and cBOD-5day (SM 5210B, and EPA 405.1). SOP/07-13 *Alpha Analytical, Inc. September 29, 2007*

8) Standard Operating Procedure TPH 8015D – Modified 0-017 (EPA 8015D Modified) *Alpha Analytical, Inc. March 04, 2008*

9) Standard Operating Procedure determination of Trace Elements in Water and Wastes by Inductively Coupled Plasma- Mass Spectrometry (200.8). SOP/06-11 Alpha Analytical, Inc. July 13, 200

10) Standard Operating Procedure Inductively Coupled Plasma – Mass Spectrometry (6020). SOP/06-10 Alpha Analytical, Inc. October 25, 2007

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EPA United States Environmental Protection Agency

Target Compounds, Uses, and Reporting Limits

Target Compound	Major Use	RL (ng/L)	Daily Dose (ng)
Caffeine	Natural Stimulant	5.0	200,000,000
1,7-DMX	Metabolite of caffeine	2.5	N/A
Acetaminophen	Pain Reliever	2.5	650,000,000
Carbamazepine	Anti- depressant / bi-polar Anti-convulsant (epilepsy)	0.5	100,000,000
Primidone	Anti- epilepsy drug (AED)	5.0	100,000,000
Atenolol	Beta Blocker High Blood Pressure	2.5	50,000,000
Cotinine	Metabolite of Nicotine	0.5	3,500-7,200 (ng/mL)
Urobilin	By-product of hemoglobin breakdown (mammals)	5.0	1,300,000 ng/g in feces
Azithromycin	Antibiotic	1.6	200,000,000

Attachment 3

STORMWATER MONITORING

Field Collection Requirements (To be recorded at each site)

Sample-
Site Name _____

Time collected_____

Date collected_____

Inspection-
****Take picture at site****
Outfall diameter_____('na' if open stream)

Flow estimate_____('na' if open stream)

Odor_____

Color_____

Turbidity_____

Floatables_____

Other observations_____

_____

YSI Meter (calibrate in lab)-
Salinity_____

Temp_____

Conductivity (give both #'s)

_____

Location information-
Short description of where sample was collected at site_____

_____

_____

GPS_____

_____

Field Kits listed in the order they should be conducted in, include any applicable notes-

NH3 strip_____

Cl2 kit_____
Hach meter – (3 min wait)

Surfactant_____
Chemetrics K-9400 Blue box/detergent test kit

Additional Notes:

(Note any changes in weather conditions)_____

_____

_____

_____

_____

Attachment 3

STORMWATER MONITORING (PAGE 2)

Field Equipment List

Waste Containers (2 total – clearly labeled):

1 liter amber plastic for surfactants/detergents kit waste
1 liter amber plastic for Cl2 kit waste

Sample Bottles (3 total for each sample location)-
120ml sterile – E.coli/entero
1 Liter amber glass: PPCP, *EPA* (Peter Philbrook)
120ml-250ml plastic – Field Kit Bottle – to be used on site for kits listed above

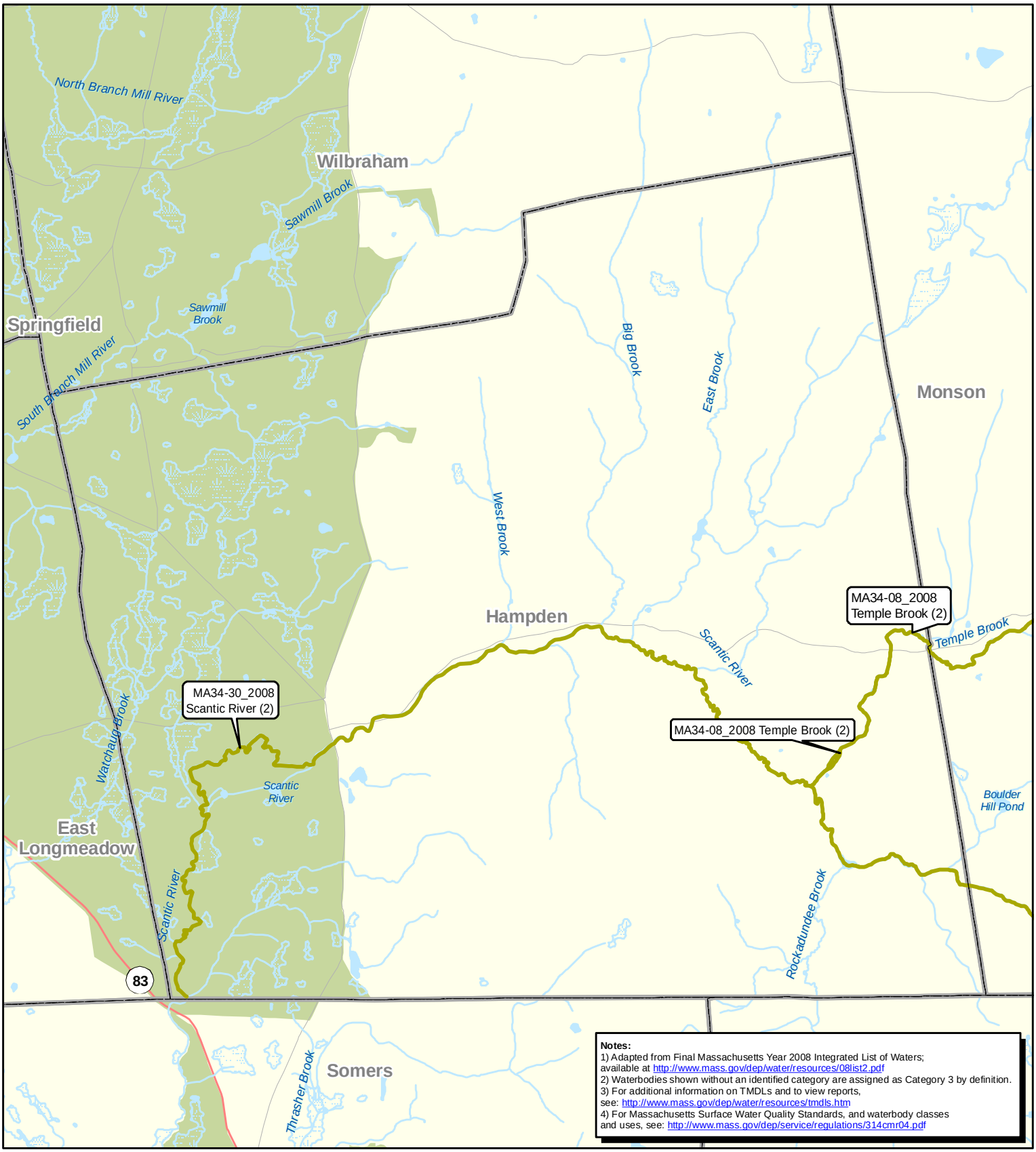
***Fill out chain of custody

In Carboy Container
☐Log book
☐COC forms
☐Extra sample bottles
☐Colored tape
☐Sharpies
☐Write-On-Rain Pens
☐Paper towels
☐GPS
☐Sampling plan & GPS locations
☐Regular length Powder Free Gloves
☐Squirt bottle of DI Water
☐Coolers with Ice
☐Waders/Boots
☐YSI multi parameter Meter

Town of Hampden IDDE Program

Appendix G

Impaired Waters and TMDLs



Notes:
1) Adapted from Final Massachusetts Year 2008 Integrated List of Waters; available at http://www.mass.gov/dep/water/resources/08list2.pdf
2) Waterbodies shown without an identified category are assigned as Category 3 by definition.
3) For additional information on TMDLs and to view reports, see: http://www.mass.gov/dep/water/resources/tmdls.htm
4) For Massachusetts Surface Water Quality Standards, and waterbody classes and uses, see: http://www.mass.gov/dep/service/regulations/314cmr04.pdf

Waterbody Assessment and TMDL Status
Hampden, MA

N

0 0.5 Miles

EPA

Map produced by EPA Region I GIS Center
Map Tracker ID 6678, February 25, 2010
Data Sources: TeleAtlas, Census Bureau, USGS, MassDEP

Waterbody Label

State ID,
Waterbody Name (Category)
(TMDL(s) approved for this waterbody)

See companion table for a listing of pollutants, non-pollutants, and TMDLs for each waterbody

Assessment of Waterbody Segment

- **Category 2:** Attaining some uses; other uses not assessed
- **Category 3:** Insufficient information to make assessments for any use.
- **Category 4a:** TMDL is completed and approved for one or more pollutants
- **Category 4c:** Impairment not caused by a pollutant.
- **Category 5:** Impaired or threatened for one or more uses and requiring a TMDL.

- Waterbodies
- Swamp/Marsh
- MS4 Urbanized Areas (2000 Census)
- Municipal Boundaries

Massachusetts Year 2014 Integrated List of Waters

Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act



CN 450.1

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Matthew A. Beaton, Secretary
Massachusetts Department of Environmental Protection
Martin Suuberg, Commissioner
Bureau of Water Resources
Douglas E. Fine, Assistant Commissioner

Massachusetts Category 2 Waters
"Attaining some uses; other uses not assessed"

NAME	SEGMENT ID	DESCRIPTION	SIZE	UNITS	USES ATTAINED*				
					Aesthetic	Fish, other Aquatic Life and Wildlife	Primary Contact Recreation	Secondary Contact Recreation	Shellfish Harvesting
Fall River	MA34-33	Vermont/Massachusetts border, Bernardston to the confluence with the Connecticut River, Greenfield/Gill	10.246	MILES	X	X			
Mill River	MA34-24	Headwaters east of Fisher Hill, Conway to confluence with the Connecticut River, Hatfield.	24.63	MILES	X	X	X	X	
Moose Brook	MA34-17	Headwaters, Southampton to confluence with Manhan River, Southampton.	2.627	MILES		X			
Sawmill River	MA34-41	Dudleyville Road, Leverett to confluence with Connecticut River, Montague (formerly part of MA34-26).	10.965	MILES	X	X	X	X	
Scantic River	MA34-30	Massachusetts/Connecticut border, Monson downstream to the Massachusetts/Connecticut border, Hampden.	9.599	MILES		X			
Temple Brook	MA34-08	Headwaters, outlet Bradley Pond, Monson to confluence with Scantic River, Hampden.	3.724	MILES		X			
Tripple Brook	MA34-16	Headwaters, Southampton to confluence with Manhan River, Southampton.	1.016	MILES		X			
Upper Highland Lake	MA34093	Goshen	51.244	ACRES	X				
West Branch Mill River	MA34-38	East Street, Goshen to the confluence of Meekin Brook, Williamsburg.	5.917	MILES	X	X	X	X	
West Branch Mill River	MA34-39	From the confluence of Meekin Brook, Williamsburg to the confluence with the East Branch Mill River (forming the headwaters of the Mill River), Williamsburg.	0.641	MILES	X	X	X	X	
Deerfield									
Bear River	MA33-17	Headwaters west of Barnes Road, Ashfield to confluence with Deerfield River, Conway.	6.926	MILES	X	X			
Clark Brook	MA33-16	Headwaters, near Moonshine Road (Howes Road)/East Buckland Road, Buckland to confluence with Clesson Brook, Buckland.	3.779086	MILES	X	X			
Clesson Brook	MA33-15	Outlet of unnamed pond south of Forget Road, Hawley through Cox Pond to confluence with Deerfield River, Buckland.	10.346	MILES	X	X	X	X	
Cold River	MA33-05	Source in Florida to confluence with Deerfield River, Charlemont.	13.719	MILES	X	X	X	X	

Massachusetts Year 2016 Integrated List of Waters

Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act



CN 470.0

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Matthew A. Beaton, Secretary
Massachusetts Department of Environmental Protection
Martin Suuberg, Commissioner
Bureau of Water Resources
Douglas E. Fine, Assistant Commissioner

Category 2 waters listed alphabetically by major watershed
"Attaining some uses; other uses not assessed"

					Uses Attained*				
WATER BODY	SEGMENT ID	Description	SIZE	UNITS	Aesthetic	Fish, other Aquatic Life and Wildlife	Primary Contact Recreation	Secondary Contact Recreation	Shellfish Harvesting
FOURMILE BROOK	MA34-56	Headwaters, south of the intersection of Four Mile Brook Road and South Mountain Road, Northfield, to mouth at confluence with Connecticut River, Northfield.	3.4	MILES	X		X	X	
HOP BROOK	MA34-61	Headwaters, west of Oasis Drive, Belchertown to mouth at confluence with Fort River, Amherst.	8.6	MILES	X		X	X	
Long Plain Brook	MA34-09	Headwaters, Leveret/Sunderland town line (in Mt. Toby State Forest) to mouth at confluence with Russellville Brook at Route 116, Sunderland.	5	MILES	X				
Mill River	MA34-24	Headwaters east of Fisher Hill, Conway to mouth at confluence with the Connecticut River, Hatfield.	24.6	MILES	X	X	X	X	
Mill River	MA34-28	Headwaters (confluence of East and West Branch Mill River, Williamsburg), to outlet Paradise Pond, Northampton.	10	MILES	X	X	X	X	
Moose Brook	MA34-17	Headwaters, perennial portion, Southampton to mouth at confluence with Manhan River, Southampton.	2.6	MILES	X	X	X	X	
NORTH BRANCH MANHAN RIVER	MA34-54	Headwaters, perennial portion, north of Northwest Road, Westhampton to mouth at confluence with Manhan River, Easthampton/Southampton.	9.2	MILES	X		X	X	
ROARING BROOK	MA34-63	From the outlet of Whately Glen Reservoir (South Deerfield Water Supply Dam, NATID: MA00522), Whatley to mouth at confluence with Mill River, Whately.	1.4	MILES	X		X	X	
RUSSELLVILLE BROOK	MA34-62	Headwaters, Route 116, Sunderland (river name changes at bridge from Long Plain Brook SARIS# 3420350) to mouth at confluence with the Connecticut River, Hadley.	4.4	MILES	X		X	X	
Sawmill River	MA34-41	Dudleyville Road, Leverett to mouth at confluence with Connecticut River, Montague (formerly part of MA34-26).	11	MILES	X	X	X	X	
Temple Brook	MA34-08	Headwaters, outlet Bradley Pond, Monson to mouth at confluence with Scantic River, Hampden.	3.6	MILES		X			
Tripple Brook	MA34-16	Headwaters, perennial portion, Southampton to confluence with Manhan River, Southampton.				X			
Upper Highland Lake	MA34093	Goshen.	51	ACRES			X	X	
West Branch Mill River	MA34-38	East Street, Goshen to the confluence of Meekin Brook, Williamsburg.	5.9	MILES		X			
West Branch Mill River	MA34-39	From the confluence of Meekin Brook, Williamsburg to mouth at confluence with East Branch Mill River (forming headwaters Mill River), Williamsburg.	0.6	MILES		X			

No change from Massachusetts Year 2014 Integrated List of Waters

* Attained uses denoted by "X". The Fish Consumption use is not supported in any waters due to the DPH statewide health advisory.

Category 5 waters listed alphabetically by major watershed
The 303(d) List – "Waters requiring a TMDL"

WATER BODY	SEGMENT ID	DESCRIPTION	SIZE	UNITS	IMPAIRMENT	EPA TMDL NO.
Longmeadow Brook	MA34-21	Headwaters, outlet Turner Park Pond, Longmeadow to mouth at confluence with Connecticut River, Longmeadow.	4.5	MILES	(Debris/Floatables/Trash*)	
					Escherichia coli	
					Phosphorus (Total)	
					Turbidity	
Manhan River	MA34-11	Outlet Tighe Carmody Reservoir, Southampton to mouth at confluence with Connecticut River, Easthampton.	18.9	MILES	Escherichia coli	
Metacomet Lake	MA34051	Belchertown.	51	ACRES	(Non-Native Aquatic Plants*)	
					Oxygen, Dissolved	
Mill Pond	MA34052	Springfield.	13	ACRES	Nutrient/Eutrophication Biological Indicators	
					Taste and Odor	
Mill River	MA34-25	Headwaters, outlet Factory Hollow Pond, Amherst to mouth at inlet Lake Warner, Hadley.	5.2	MILES	Escherichia coli	
Mill River	MA34-29	Headwaters, outlet Watershops Pond, Springfield to mouth at confluence with Connecticut River, Springfield. (Interrupted stream).	1.3	MILES	(Debris/Floatables/Trash*)	
					Escherichia coli	
					Taste and Odor	
Nashawannuck Pond	MA34057	Easthampton.	30	ACRES	(Non-Native Aquatic Plants*)	
					Nutrient/Eutrophication Biological Indicators	
					Phosphorus (Total)	
Noonan Cove	MA34058	Springfield.	3	ACRES	Aquatic Plants (Macrophytes)	
					Turbidity	
Oxbow	MA34066	The water body west of Route 91 (bounded on the northeast by Route 91, the southeast by the Manhan River, and the west by Old Springfield Road), Northampton/Easthampton (excluding the delineated segment; Danks Pond MA34019).	149	ACRES	(Non-Native Aquatic Plants*)	
					Turbidity	
Porter Lake	MA34073	Springfield.	28	ACRES	(Non-Native Aquatic Plants*)	
					Aquatic Plants (Macrophytes)	
					Excess Algal Growth	
Porter Lake West	MA34072	Springfield.	5	ACRES	(Non-Native Aquatic Plants*)	
					Aquatic Plants (Macrophytes)	
					Excess Algal Growth	
Scantic River	MA34-30	Massachusetts/Connecticut border, Monson downstream to the Massachusetts/Connecticut border, Hampden.	9.6	MILES	Escherichia coli	
Stony Brook	MA34-19	Headwaters, Granby to mouth at confluence with Connecticut River, South Hadley (thru Upper Pond formerly segment MA3409 and Lower Pond formerly segment MA34049).				
					Turbidity	
Unnamed Tributary	MA34-60	Unnamed tributary to the Connecticut River, locally known as 'Willamanett Brook', headwaters, perennial portion, east of Memorial Drive (Route 33), Chicopee to mouth at confluence with Connecticut River, Chicopee (approximatley 1200 feet culverted near mouth).	2.3	MILES	Escherichia coli	

Listed as Category 2 Water in Massachusetts Year 2014 Integrated List of Waters

APPENDIX F
Requirements for Discharges to Impaired Waters with an Approved TMDL

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

Attachment 3 - Phosphorus Reduction Credits For Selected Structural BMPs

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.

Town of Hampden IDDE Program

Appendix H

Tracking Implementation Goals

Town of Hampden IDDE Program

Appendix I

IDDE Training Program Log

TOWN OF HAMPDEN
IDDE PROGRAM EMPLOYEE TRAINING LOG

Training date:	
Title of Training:	
Training Duration (minutes):	
Subject(s) covered during Training: (Attach copy of training materials, if applicable)	
Employee(s) Trained:	**Signature:**

Tighe&Bond

APPENDIX I

STANDARD OPERATING PROCEDURE 1: CATCH BASIN CLEANING
HAMPDEN HIGHWAY DEPARTMENT

DESCRIPTION: Procedures for catch basin inspection and cleaning, and disposal of screenings. Catch basins help minimize flooding and protect water quality by removing trash, sediment, decaying debris, and other solids from stormwater runoff. Catch basin cleaning reduces foul odors, prevents clogs in the storm drain system, and reduces the loading of suspended solids, nutrients, and bacteria to receiving waters.

TARGETED CONSTITUENTS:

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics

STRUCTURAL CONTROLS:

- Install hoods if catch basins do not have them.
- Repair damaged catch basins including outlet traps.
- Repair damaged catch basins timely manner.

OPERATIONAL BEST MANAGEMENT PRACTICES:

- Catch basin sump sediment levels are checked twice per year to determine how full they area. If the sumps are at or over 50% full, the catch basins are cleaned
- Target cleaning for early Spring or late Fall.
- Clean manually or with equipment (i.e., bucket loaders).
- Properly dispose of catch basin material or store until contractor picks up cleanings (Massachusetts DEP and EPA requires chemical analysis to determine if substance is hazardous waste).
- Inform employees that catch basins are part of the stormwater drainage system and not the sanitary sewer system.
- Maintain a log of cleaning activities. Information should include the amount of cleanings removed and areas with heavily filled basins.
- Maintain a log of cleaning activities carried out in parking lots. Information should include the amount of cleanings removed, heavily filled catch basins, and dates cleaned.
- Inspect catch basins, grates, and ditches at least twice per year. Inspections should be incorporated during routine cleaning, as part of reconstruction contracts, after significant storm events, and through requests made by residents or other City departments.
- Prioritize inspection and maintenance of catch basins near construction sites.
- If a catch basin sump is more than 50 percent full during two consecutive routine inspections/cleaning events, the Town must document that finding, investigate the contributing drainage area for sources of excessive sediment loading, and to the extent practicable, abate contributing sources.
- Describe any actions taken relevant to investigating and abating areas of high sediment loading in the stormwater annual report.
- Note problem areas accumulating heavy loads of leaf litter, trash or pet waste bags that may warrant targeted educational outreach or enforcement efforts.

DATA GATHERING

During regular cleaning and inspection procedures, data can be gathered related to the condition of the physical basin structure and its frame and grate and the quality of stormwater conveyed by the structure. Observations such as the following can indicate sources of pollution within the storm drain system:

- Oil sheen
- Discoloration
- Trash and debris

Both bacteria and petroleum can create a sheen on the water surface. The source of the sheen can be differentiated by disturbing it, such as with a pole. A sheen caused by a oil will remain intact and move in a swirl pattern; a sheen caused by bacteria will separate and appear "blocky". Bacterial sheen is not a pollutant but should be noted.
Observations such as the following can indicate a potential connection of a sanitary sewer to the storm drain system, which is an illicit discharge.

- Indications of sanitary sewage, including fecal matter or sewage odors
- Foaming, such as from detergent
- Optical enhancers, fluorescent dye added to laundry detergent

Each catch basin should be cleaned at least annually. Catch basins in high-use areas may require more frequent cleaning. Performing street sweeping on an appropriate schedule will reduce the amount of sediment, debris, and organic matter entering the catch basins, which will in turn reduce the frequency with which structures need to be cleaned.

CLEANING PROCEDURE

Catch basin inspection cleaning procedures should address both the grate opening and the basin's sump. Document any and all observations about the condition of the catch basin structure and water quality on the Catch Basin Inspection Form (attached).

Catch basin inspection and cleaning procedures include the following:

1. Work upstream to downstream.
2. Clean sediment and trash off grate.
3. Visually inspect the outside of the grate.
4. Visually inspect the inside of the catch basin to determine cleaning needs.
5. Inspect catch basin for structural integrity.
6. Determine the most appropriate equipment and method for cleaning each catch basin.
    a. Manually use a shovel to remove accumulated sediments, or
    b. Use a bucket loader to remove accumulated sediments, or
    c. Use a high-pressure washer to clean any remaining material while capturing the slurry with a vacuum.
    d. If necessary, after the catch basin is clean, use the rodder of the vacuum truck to clean downstream pipe and pull back sediment that might have entered downstream pipe.

7. If contamination is suspected, chemical analysis will be required to determine if the materials comply with the Massachusetts DEP Hazardous Waste Regulations, 310 CMR 30.000. Chemical analysis required will depend on suspected contaminants. Note the identification number of the catch basin on the sample label, and note sample collection on the Catch Basin Inspection Form.
8. Properly dispose of collected sediments. See following section for guidance.
9. If fluids collected during catch basin cleaning are not being handled and disposed of by a third party, dispose of these fluids to a sanitary sewer system, with permission of the system operator.
10. If illicit discharges are observed or suspected, notify the appropriate Department.
11. At the end of each day, document location and number of catch basins cleaned, amount of waste collected, and disposal method for all screenings.
12. Report additional maintenance or repair needs to the appropriate Department.

DISPOSAL OF SCREENINGS

Catch basin cleanings from storm water-only drainage systems may be disposed at any landfill that is permitted by MassDEP to accept solid waste. MassDEP does not routinely require stormwater-only catch basin cleanings to be tested before disposal, unless there is evidence that they have been contaminated by a spill or some other means.

Screenings may need to be placed in a drying bed to allow water to evaporate before proper disposal. In this case, ensure that the screenings are managed to prevent pollution.

Refer to the attached MassDEP Guidance Document – Catch Basin Cleanings.

TRAINING

Employees are trained ***once per year*** on this procedure and the proper operation of equipment. Employees are also trained on stormwater pollution prevention, spill and response, and illicit discharge detection and elimination procedures.

RECORD KEEPING

1. Records are kept at the ***Highway Department at 589 Main Street in Hampden, MA***.
2. Records shall include a log of catch basins cleaned or inspected, the total number of catch basins, number inspected, number cleaned, and the total volume or mass of material removed from all catch basins.

REVISING THE SOP

These procedures are reviewed ***once per year*** and updated as needed.

Job No.: _____ **Town:** **Hampden**

Inspector: _____ **Date:** _____

CATCH BASIN INSPECTION FORM

Catch Basin I.D.	_____	**Final Discharge from Structure?** Yes ☐ No ☐ **If Yes, Discharge to Outfall No:**_____	
Catch Basin Label:	**Stencil** ☐ **Ground Inset** ☐ **Sign** ☐ **None** ☐ **Other**_____		
Basin Material:	Concrete ☐ Corrugated metal ☐ Stone ☐ Brick ☐ Other: _____ ☐	**Catch Basin Condition:**	Good ☐ Poor ☐ Fair ☐ Crumbling ☐
Pipe Material:	Concrete ☐ HDPE ☐ PVC ☐ Clay Tile ☐ Other:_____	**Pipe Measurements:**	Inlet Dia. (in): d= ____ Outlet Dia. (in): D= ____

Required Maintenance/ Problems (check all that apply):

- ☐ Tree Work Required
- ☐ New Grate is Required
- ☐ Pipe is Blocked
- ☐ Frame Maintenance is Required
- ☐ Remove Accumulated Sediment
- ☐ Pipe Maintenance is Required
- ☐ Basin Undermined or Bypassed
- ☐ Cannot Remove Cover
- ☐ Ditch Work
- ☐ Corrosion at Structure
- ☐ Erosion Around Structure
- ☐ Remove Trash & Debris
- ☐ Need Cement Around Grate

Other: _____

Catch Basin Grate Type :	**Sediment Buildup Depth :**	**Description of Flow:**	**Street Name/ Structure Location:**
Bar: ☐ Cascade: ☐ Other:_____ Properly Aligned: Yes ☐ No ☐	0-6 (in): _____ 6-12(in): _____ 12-18 (in): _____ 18-24 (in): _____ 24 + (in): _____	Heavy ☐ Moderate ☐ Slight ☐ Trickling ☐	

***If the outlet is submerged check yes and indicate approximate height of water above the outlet invert.** h above invert (in):___ Yes ☐ No ☐

☐ **Flow**

☐ **Standing Water**

(check one or both)

Observations:

Color:	
Odor:	

Weather Conditions : Dry > 24 hours ☐ Wet ☐

Sample of Screenings Collected for Analysis? Yes ☐ No ☐

Comments:

Circle those present:

Foam	Oil Sheen
Sanitary Waste	Bacterial Sheen
Orange Staining	Floatables
Excessive sediment	Pet Waste
Other:_____	Optical Enhancers

Town of Hampden (NPDES Permit #MA041009), Annual Catch Basin Cleaning Summary

Reporting Period *(e.g., July 1, 2018 – July 1, 2019)*	Total Number of Catch Basins	Total Number of Catch Basins Inspected	Total Number of Catch Basins Cleaned	Total Volume or Mass of Material Removed from Catch Basins

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs
Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

Management of Catch Basin Cleanings

Catch basin cleanings - solid materials such as leaves, sand and twigs removed from storm water collection systems during cleaning operations - are typically classified as a solid waste by the Department of Environmental Protection (MassDEP). Catch basin cleanings must be handled and disposed in accordance with the agency's applicable regulations, policies and guidance.

Handling & Disposal

Except as explained below, catch basin cleanings from storm water-only drainage systems may be disposed at any landfill that is permitted by MassDEP to accept solid waste.

MassDEP does not routinely require storm water only catch basin cleanings to be tested before disposal, unless there is evidence that they have been contaminated by a spill or some other means. Contaminated catch basin cleanings must be evaluated in accordance with 310 CR 30.000: Hazardous Waste Regulations and handled as hazardous waste if appropriate.

Systems that collect storm water run-off into sanitary sewers are called "combined sewers." MassDEP may require cleanings from combined sewer catch basins to be tested before disposal.

Landfill Restrictions

The MassDEP 310 CMR 19.000: Solid Waste Management Facility Regulations (specifically see Section 19.130(7)) prohibit Massachusetts landfills from accepting materials that contain free draining liquids. When there is no free water in a truck used to transport catch basin cleanings, the agency will generally be satisfied that the material is sufficiently dry. Otherwise, the material will need to undergo a Paint Filter Liquids Test.

One way to remove liquids is to use a hydraulic lift truck during catch basin cleaning operations so that the material can be decanted at the site. After material from several catch basins along the same system is loaded, the truck may be elevated so that any free draining liquid is allowed to flow back into the drainage structure.

MassDEP may approve catch basin cleanings for use as grading and shaping material at landfills undergoing closure (see the agency's Revised Guidelines for Determining Closure Activities at Inactive Unlined Landfill Sites for additional information). Catch basin cleanings may be used as daily cover or grading material at active landfills only with specific MassDEP approval of the proposed use.

Consult with the Solid Waste Section Chief in the appropriate MassDEP Regional Office for information about applying for an approval and/or a Beneficial Use Determination (see Section 19.060 for other uses, including non-landfill uses).

STANDARD OPERATING PROCEDURE 2: SWEEPING STREETS AND PARKING LOTS
HAMPDEN HIGHWAY DEPARTMENT

DESCRIPTION: Procedures for the operation and maintenance of street sweepers, frequency of sweeping, disposal of debris, and recordkeeping to prevent coarse particles, leaves, and trash from entering the stormwater sewer system. Sweeping is most effective for removing coarse particles, leaves, and trash. Regularly sweeping reduces catch basin cleaning.

The Town does not currently own street sweeping equipment. The Town sweeps streets with curbing and/or catch basins between the months of April and May in the spring and September and November in the fall as required by the Nitrogen TMDL enhanced BMP requirements described in Appendix F of the 2016 Massachusetts Small MS4 General Permit. A list of streets and parking lots to be swept is kept at the Highway Department at 589 Main Street in Hampden.

TARGETED CONSTITUENTS:

- Sediment
- Nutrients
- Salt
- Organics
- Trash
- Metals
- Oil & Grease

STRUCTURAL CONTROLS:

- Use vacuum or regenerative air sweepers in areas with fine sediments (mechanical sweepers are not effective at removing finer sediments); vacuum sweepers can only be used in dry conditions.
- Stabilize exposed soil areas on unpaved roads to prevent soil from eroding during rain events.

OPERATIONAL BEST MANAGEMENT PRACTICES:

- Adhere to the Town's cleaning schedule – every roadway with catch basins swept twice annually, prioritizing main roads. Perform additional sweeping as needed.
- Town parking lots should be checked regularly by Highway Department personnel and swept when needed, and at a minimum annually.
- Avoid wet cleaning or flushing of street- utilize dry methods where possible.
- Before sweeping, manually rake sand from any turf areas on surfaces to be swept.
- Sweep in pattern to keep spilled material from being pushed into catch basins.
- Use hand-held tools to assist with mechanical equipment.
- Adjust broom frequently to maximize efficiency of sweeping operations. Do not use kick brooms or sweeper attachments that tend to spread dirt.
- After sweeping is finished, properly dispose of sweeper wastes.
- Any visible sediment should be swept up (including sand/salt mixtures and granular material).
- Keep accurate logs of the number of curb-miles swept, and note heavily sedimented areas.
- Continue Fall leaf pickup and composting.

STANDARD OPERATING PROCEDURE 2: SWEEPING STREETS AND PARKING LOTS
HAMPDEN HIGHWAY DEPARTMENT

STORAGE AND DISPOSAL OF SWEEPINGS

1. Temporary storage of solid sweeping debris is on an impervious surface or in a truck/dumpster that is protected from runoff. The temporary storage location is at the Transfer Station in Hampden, MA.
2. Solid sweeping debris will be reused following the MassDEP Reuse and Disposal of Street Sweepings Policy (attached) as shoulder grading material.
3. Decant water is returned to the catch basin of origin.

TRAINING

Employees are trained once per year on this procedure and the proper operation of equipment. Employees are also trained on stormwater pollution prevention, spill and response, and illicit discharge detection and elimination procedures.

RECORD KEEPING

1. Records are kept at the Highway Department at 589 Main Street in Hampden, MA.
2. Streets swept and quantity of sand/debris collected by sweeping are recorded after each sweeping event.
3. The number of curb miles swept per month is calculated annually.
4. A list of employees implementing the SOP and the completion of their training(s) can be found at the Highway Department at 589 Main Street in Hampden, MA.

REVISING THE SOP

These procedures are reviewed once per year and updated as needed.

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

REUSE AND DISPOSAL OF STREET SWEEPINGS

DEPARTMENT OF ENVIRONMENTAL PROTECTION

POLICY # BAW-18-001

(SUPERSEDES POLICY # BWP-94-092)

This Policy provides guidance to the regulated community about the Department of Environmental Protection's requirements, standards, and approvals for handling reuse or disposal of street sweepings. This Policy supersedes Department Policy BWP-94-092.

5/14/18
Date

Christine Kirby
Assistant Commissioner

This information is available in alternate format. Contact Michelle Waters-Ekanem, Director of Diversity/Civil Rights at 617-292-5751.
TTY# MassRelay Service 1-800-439-2370
MassDEP Website: www.mass.gov/dep
Printed on Recycled Paper

POLICY #BAW-18-001
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1. Policy Statement and Scope

This Policy explains MassDEP requirements for managing Street Sweepings. Street Sweepings are "solid waste" subject to the Massachusetts solid waste regulations. The options for managing Street Sweepings are as follows.

- Use the Street Sweepings in accordance with the preapproved uses described in Section 4 of this policy.
- Use the Street Sweepings for a beneficial use not included in the list of preapproved uses after obtaining a permit from MassDEP under the provisions of the solid waste regulations, 310 CMR 19.060, Beneficial Use of Solid Wastes.
- Dispose of Street Sweepings at a permitted solid waste landfill.

2. Applicability

This policy applies to the reuse or disposal of Street Sweepings that are generated in the ordinary and customary cleaning of roadways and parking lots. This policy does not apply to catch basin cleanings or Street Sweepings mixed with catch basin cleanings or any other type of wastes. The disposal and reuse of catch basin cleanings is discussed in the "Management of Catch Basin Cleanings" Fact Sheet issued by the MassDEP (https://www.mass.gov/lists/massdep-solid-waste-policies-guidance-fact-sheets).

This policy does not apply to the material generated as the result of the clean-up of an oil or hazardous material spill. However, Street Sweepings that are generated in the ordinary and customary maintenance of roadways and parking lots are not exempt from the Hazardous Waste Regulations, 310 CMR 30.000, and must be handled as hazardous waste when they exhibit any of the characteristics of a hazardous waste. If there is no evidence of unusual contamination, MassDEP does not require Street Sweepings to be routinely tested, but, as is the case with any waste, the generator has the ultimate responsibility for determining whether the waste is a hazardous waste.

Although Street Sweepings are not considered soil, they may be managed under Policy #COMM-97-001, "Reuse and Disposal of Contaminated Soil at Massachusetts Landfills", in accordance with Section 5.5 of this policy.

3. Definitions

This section contains definitions of the important terms used in this Policy.

Department or *MassDEP* means the Massachusetts Department of Environmental Protection.

Parking lots mean publicly or privately owned paved areas that provide access for the general public to park their car while patronizing retail or service businesses. Parking lots also include the paved areas used by the employees at office parks and businesses.

Private way means the strip of land over and under a privately owned, paved road or highway.

Public way means the strip of land over and under a publicly owned, paved road or highway and includes the publicly owned land adjacent to the road or highway.

Street Sweepings means materials consisting primarily of sand and soil generated during the routine cleaning of roadways or parking lots but may also contain some leaves and other miscellaneous solid wastes collected during street sweeping. Street Sweepings do not include the material generated during the clean-up of a spill or material from other structures associated with a roadway such as catch basins.

Urban center roads mean local roads in central commercial and retail business districts and industrial and manufacturing areas.

4. Handling

4.1 Collection of Street Sweepings

Although MassDEP does not regulate the collection of Street Sweepings, collection practices should be compatible with intended uses. Keeping sweepings from Urban Center Roads separate from sweepings from other areas will provide the generator of the Street Sweepings with the most options under this policy.

This policy does not cover sweepings known to be contaminated by spills, and such sweepings should be collected separately and kept segregated. Depending on the contamination and circumstances, the handling of contaminated sweepings may be governed by the Massachusetts Contingency Plan, 310 CMR 40.0000, the Massachusetts Hazardous Waste Regulations, 310 CMR 30.000, the Massachusetts Site Assignment Regulations for Solid Waste Facilities, 310 CMR 16.00 or the Massachusetts Solid Waste Management Facility Regulations, 310 CMR 19.000.

4.2 Storage

Street Sweepings shall be temporarily stored prior to use, only when the following conditions are satisfied:

- Storage must be:
    - at the site where the sweepings are generated (e.g. at a parking area that was swept);
    - at a location, such as a Department of Public Works (DPW) yard, that is under the control of the governmental entity doing the sweeping or has contracted for the sweeping; or,

  - at other locations with prior written approval from the appropriate MassDEP Regional Office.
- The Street Sweepings shall be protected from wind and rain to the extent necessary to prevent dust, erosion, and off-site migration;
- The Street Sweepings shall not be stored within the 100 foot buffer zone of a wetland or within wetland resource areas including bordering vegetative wetlands and riverfront areas;
- The Street Sweepings shall not be stored within 500 feet of a ground or surface drinking water supply;
- Storage of the Street Sweepings shall incorporate good management practice and result in no public nuisance; and
- Storage of the Street Sweepings must be temporary. Street Sweepings shall be used within one year of collection unless the MassDEP Regional Office where the Street Sweepings are stored grants a written extension. An extension may be granted when it is demonstrated that all storage conditions will continue to be satisfied and the stored Street Sweepings will be put to a specific identified use prior to the expiration of the extension period.

4.3 Preparation Prior to Use

Solid waste, such as paper, auto parts and other trash, shall be removed from all Street Sweepings prior to use. Solid waste screened from the Street Sweepings shall be disposed of at a permitted solid waste facility. Leaves, twigs and other organic matter should also be removed when good engineering practice indicates this is necessary to produce a material that is suitable for the intended use.

5. Approved Uses, Restrictions & Conditions-No Prior Approval Needed from MassDEP

This policy allows Street Sweepings to be used in several applications. An approval from MassDEP is not required when the restrictions and conditions are adhered to as identified in this policy. However, Street Sweepings shall not be used unless prior approval is obtained from the owner of the location where the sweepings are to be used.

5.1 Use at Landfills

Street Sweepings may be used for daily cover at permitted lined solid waste landfills and need no prior MassDEP approval if the Street Sweepings satisfy the requirements for daily cover material specified at 310 CMR 19.130(15). A list of active permitted solid waste landfills can be found on the MassDEP website.

5.2 Use as Fill in Public or Private Ways and Parking Lots

Street Sweepings may be used for fill in public and private ways and parking lots without prior approval from MassDEP only when the following additional restrictions and conditions are observed:

- The Street Sweepings have not been collected from Urban Center Roads (see definition);
- Any collection, storage, or preparation for use of the Street Sweepings shall be in accordance with Sections 4.1 and 4.2 of this policy.
- The Street sweepings have been screened to remove all debris and solid waste and all debris/solid waste screened from the sweepings shall be disposed at a permitted solid waste facility (see Section 8);
- The Street Sweepings are kept above the level of the groundwater;
- The Street Sweepings are not used in designated "No Salt Areas";

- The Street Sweepings are not used within the 100 foot buffer zone of a wetland or within wetland resource areas including bordering vegetative wetlands and riverfront areas;
- The Street Sweepings are not used within 500 feet of a ground or surface drinking water supply;
- In public ways the Street Sweepings are used under the paved road surface or, except in residential areas, as fill along the side of the road within the public way;
- In private roadways or in residential areas the Street Sweepings are used only under the paved road surface; and
- In parking lots the Street Sweepings are used only under the paved parking surface.

5.3 Use As an Additive to Restricted Use Compost

Street Sweepings may be used as an additive to compost without prior written approval from MassDEP only when the following additional restrictions and conditions are observed:

- The Street Sweepings have not been collected from Urban Center Roads (see definition);
- Any collection, storage, or preparation for use of the Street Sweepings shall be in accordance with Sections 4.1 and 4.2 of this policy.
- The Street Sweepings have been screened to remove all debris and solid waste and all debris and solid waste screened from the sweepings is disposed at a permitted solid waste facility (see Section 8);
- The compost is used only along public ways and parking lot areas;
- The compost is not used in residential areas;
- The compost is kept above the level of the groundwater;
- The compost is not used in designated "No Salt Areas";
- The compost is not used within the 100 foot buffer zone of a wetland or within wetland resource areas including bordering vegetative wetlands and riverfront areas; and
- The compost is not used within 500 feet of a ground or surface drinking water supply.

5.4 Reuse as Anti-Skid Material

Street Sweepings may be used as a component to anti-skid material (e.g. street sanding material) without prior written approval from MassDEP only when the following additional restrictions and conditions are observed:

- The Street Sweepings have not been collected from Urban Center Roads (see definition);
- Any collection, storage, or preparation for use of the Street Sweepings shall be in accordance with Sections 4.1 and 4.2 of this policy;
- The Street Sweepings have been screened to remove all debris and solid waste and all debris and solid waste screened from the Street Sweepings is disposed at a permitted solid waste facility (see Sections 8);
- The anti-skid material/Street Sweepings are not used in designated "No Salt Areas";
- The anti-skid material/Street Sweepings are not used within the 100 foot buffer zone of a wetland or within wetland resource areas including bordering vegetative wetlands and riverfront areas; and
- The anti-skid material/Street Sweepings are not used within 500 feet of a ground or surface drinking water supply.

The use of Street Sweepings as anti-skid material in accordance with this policy is not a determination of the efficacy of the material for this purpose. Proper engineering review should be done to ensure the material works as intended.

5.5 Reuse at Landfills Regulated Under MassDEP Policy #COMM-97-001

Street Sweepings may be reused at a permitted Massachusetts landfill and need no prior written MassDEP approval if the sweepings have been adequately characterized pursuant to the MassDEP Policy #COMM-97-001 and the Street Sweepings have been screened to remove debris and solid waste.

All screened debris and solid waste removed from Street Sweepings shall be disposed of at a permitted solid waste facility. Street Sweepings for use at the landfill may contain only incidental, randomly dispersed, de minimis quantities of ash and/or Solid Waste as defined in 310 CMR 16.000 and 310 CMR 19.000, which collectively shall comprise less than 1% by volume of the Street Sweeping materials, as determined by visual inspections. Any Street Sweeping materials approved and brought onto the landfill property for use at the landfill shall contain no more than 5% (by volume) of Asphalt Pavement, Brick, and Concrete ("ABC") material (as defined in 310 CMR 19.000), as determined by visual inspection. Any such material must measure less than 6 inches in any dimension.

Persons who wish to send Street Sweepings to a landfill must comply with MassDEP Policy #COMM-97-001 which requires sampling of the Street Sweepings to demonstrate that the Street Sweepings meet the standards listed in the Policy.

5.6 Use at Reclamation Soil Facilities Regulated Under MassDEP Policy # COMM-15-01

Street Sweepings may be used for fill at a permitted Reclamation Soil Facility (the Facility) and need no prior written MassDEP approval if the Street Sweepings have been adequately characterized pursuant to the Facility-specific Soil/Fill Management Plan and the Street Sweepings have been screened to remove debris and solid waste.

All screened debris and solid waste removed from Street Sweepings shall be disposed of at a permitted solid waste facility. Street Sweepings for use at the Facility may contain only incidental, randomly dispersed, de minimis quantities of ash and/or Solid Waste as defined in 310 CMR 16.000 and 310 CMR 19.000, which collectively shall comprise less than 1% by volume of the Street Sweeping materials, as determined by visual inspections. Any Street Sweeping materials approved and brought onto the property for use at the Facility shall contain no more than 5% (by volume) of ABC material, as determined by visual inspection. Any such material must measure less than 6 inches in any dimension.

Pursuant to Policy # COMM-15-01, persons who wish to send Street Sweepings to a Facility must sample and analyze the Street Sweepings as required by the Facility's Soil/Fill Management Plan and demonstrate that the Street Sweepings meets the Facility's acceptance criteria. Unless specifically addressed in a Facility's Soil/Fill Management Plan, a minimum sampling frequency of 1 sample per 100 cubic yards is required for characterization of Street Sweepings originating from Urban Center Roads. Street Sweepings originating from non-Urban Center Roads may be sampled at a minimum of 1 sample per 500 cubic yards. Regardless of its point of origin, if the total quantity of Street Sweepings is less than 100 cubic yards, a minimum of one composite sample is required for characterization of the material. A list of active permitted Reclamation Soil facilities may be found at https://www.mass.gov/soil-transport-re-use-and-disposal.

6. Approved Use, Restrictions & Conditions- Prior Approval Needed from MassDEP

This policy allows Street Sweepings to be used in several applications. Prior written approval from MassDEP is required when using the Street Sweepings as identified in this section of the policy. In addition, Street Sweepings shall not be used at a location until prior written approval is obtained from the owner of the location where the Street Sweepings are to be used.

6.1 Use as a Bulking Agent for Wastewater Sludge or Septage Disposal

Street Sweepings may be used as a bulking material for wastewater treatment plant sludge or septage when the mixed material will be disposed in a permitted lined or unlined sludge or septage landfill in compliance with MGL Chapter 21, Sections 26-53 and MGL Chapter 83 Sections 6 & 7 provided that the appropriate MassDEP Regional Office's Bureau of Water Resources has granted prior written approval.

7. Other Uses

Any use not approved in this policy requires a MassDEP permit under the Beneficial Use provisions of the Solid Waste Management Facility Regulations at 310 CMR 19.060. A "Beneficial Use Determination" (BUD) can be issued only after the submission of an application characterizing the waste and describing the proposed beneficial use.

8. Disposal

While the beneficial use of Street Sweepings is strongly encouraged, MassDEP does not prohibit the disposal of Street Sweepings. Street Sweepings may be disposed in permitted solid waste landfills without prior approval from the Department.

9. Record Keeping

Any entity using Street Sweeping for any use listed under sections 5.3 or 5.4 shall keep records for a period of three years of the source of the sweepings, the location of use and the amount of sweepings used.

10. Additional Information

For additional copies of this policy, permit application forms or other MassDEP documents, call any MassDEP Regional Office and ask for the Service Center or visit http://www.mass.gov/dep. The permit application numbers for Beneficial Use Determinations are BWP SW 39, 40, 41 and 42.

Copies of all Massachusetts regulations, including the solid waste regulations, are available at the MassDEP website and may also be purchased from the State House Bookstore at 617-727-2834. The solid waste regulations are:

- 310 CMR 16.000, Site Assignment Regulations for Solid Waste Facilities: and,
- 310 CMR 19.000, Solid Waste Management Facility Regulations.

If you have technical questions about the policy, please call any MassDEP Regional Office and ask to speak with a staff member in the solid waste program

STANDARD OPERATING PROCEDURE 3: ROAD SALT/SALT APPLICATION & STORAGE
HAMPDEN HIGHWAY DEPARTMENT

DESCRIPTION: Procedures for the proper storage, use, and disposal of salt and sand/salt mixtures during de-icing activities, and procedures for proper snow management in order to prevent or minimize runoff and pollutant loading impacts.

On an annual basis, the Town of Hampden uses a mixture of coarse and sand in de-icing operations. The Town currently stores salt and sand in a covered structure at a storage shed in the Highway Department yard. Spreaders are calibrated every fall.

Proper road salt and sand applications and storage are necessary to prevent contamination to surface and groundwater supplies. Salts are very soluble—once in contact with water there is no way to remove salt. The major reasons for keeping salt covered and controlling use are that salt:

- Kills vegetation
- Corrodes infrastructure
- Blocks storm drains and swales
- Increases sedimentation to streams and rivers
- Some salts contain phosphorus, nitrogen, copper, and cyanide

TARGETED CONSTITUENTS:

- Salt
- Sediment
- Nutrients
- Metals
- Trash
- Oil & grease
- Organics
- Low Dissolved Oxygen

STRUCTURAL CONTROLS:

Storage facilities for salt and sand/salt mixtures should have the following:

- Covered structure on impervious surface.
- Drainage should be diverted away from storage facility.
- Sand/salt handling should be done within storage facility.
- Should not be located in a water supply watershed or within 100-year floodplain.

OPERATIONAL BEST MANAGEMENT PRACTICES:

- Establish a low salt area near any water bodies or water supply areas.
- When feasible, use higher percentage of sand in sand/salt mixture.
- Educate and train operators on hazards of over-salting to roads and environment at the beginning of the snow season as part of meetings with supervisors and drivers.
- Regulate the amount of road salt applied to prevent over-salting of motorways and increasing runoff concentrations.
- Calibrate spreaders in trucks to ensure accurate, efficient distribution of salt.
- Establish air temperature and snow depth conditions favorable for successful use of salt.
- Use alternative materials, such as sand or gravel, in especially sensitive areas.
- Use environmentally friendly product alternatives to traditional deicing salt.
- Inspect salt storage shed for leaks on a regular basis including Fall and Spring – look for salt stains in ground near and around the salt storage shed, loading area, or downslope. Repair any salt leaks.
- Inspect salt regularly for lumping or water contamination.

The major materials are used in snow and ice control are coarse sand and coarse salt. These materials are stockpiled in advance of an event and are immediately available when needed and stocks are replenished between events.

Sand
Sand is used as an abrasive for traction on slick roadways. Approximately 40-50 cubic yards are anticipated to be used per year. Sand is stored in the covered facility located at: Highway Department at 589 Main Street in Hampden, MA. Sand use Loading areas and yards are swept after every use to prevent sand build-up and run-off.

Salt
Salt is used to expedite the melting of snow and ice from the street surface and also to keep the ice from forming a bond to the street surface. Approximately 1,200 tons of salt are anticipated to be used per year. Salt is stored in the covered facility located at: Highway Department at 589 Main Street in Hampden, MA. Loading areas and yards are swept after every use to prevent sand build-up and run-off.

PROCEDURES

Salt Application

1. Whenever conditions warrant, salt is applied to the roadway prior to accumulation of snow to prevent compacted snow from bonding to the roadway surface. The Highway Superintendent will instruct staff when salt application is appropriate.
2. Prior to salt application, equipment will be checked to ensure proper working order and ensure proper calibration of equipment. All fluid levels will be checked and filled to proper levels, all lights must be in working order. A visual walk-around inspection of the truck or equipment must be made. Any repairs must be made and reported to a supervisor or mechanic before leaving the yard.
3. Follow the prioritized route or schedule. This schedule is located at kept at the Highway Department at 589 Main Street in Hampden, MA.
4. Before parking any truck or equipment after use, all fluid levels will be checked and filled. All minor repairs will be done by the operator. Any repairs the operator cannot perform will be written up on the proper forms and turned in to the Highway Superintendent. The Highway Superintendent will determine importance and will assign the repairs according to schedule. All deicing chemical will be washed from equipment at the wash bay or designated wash area.

Sand Application

1. Whenever conditions warrant, sand is applied to the roadway to increase traction. The Highway Superintendent will instruct staff when sand application is appropriate.
2. Prior to sand application, equipment will be checked to ensure proper working order and ensure proper calibration of equipment. All fluid levels will be checked and filled to proper levels, all lights must be in working order. A visual walk-around inspection of the truck or equipment must be made. Any repairs must be made and reported to a supervisor or mechanic before leaving the yard.
3. Follow the prioritized route or schedule. This schedule is located at the Highway Department at 589 Main Street in Hampden, MA.
4. Before parking any truck or equipment after use, all fluid levels will be checked and filled. Blades or bolts, which need replacing, will be taken care of unless told to do otherwise. Chains that need repairs will be repaired. All minor repairs will be done by the operator. Any repairs the operator cannot perform will be written up on the proper forms and turned in to the Highway Superintendent. The Highway Superintendent will determine importance and will assign the repairs according to schedule.

STANDARD OPERATING PROCEDURE 3: ROAD SALT/SALT APPLICATION & STORAGE
HAMPDEN HIGHWAY DEPARTMENT

TRAINING

Employees are trained once per year on this procedure and the proper operation of equipment. Employees are also trained on stormwater pollution prevention, spill and response, and illicit discharge detection and elimination procedures.

RECORD KEEPING

1. Maintain a master schedule of prioritized snow and sanding routes and the miles or roads plowed or sanded at the Highway Department at 589 Main Street in Hampden, MA.
2. Keep copies of manufacturer's recommendations for equipment calibration, plowing speed and salt/sand application rates at the Highway Department at 589 Main Street in Hampden, MA.
3. Keep records of the amounts of salt, sand, and any liquid deicer or salt alternatives applied per season at the Highway Department at 589 Main Street in Hampden, MA**.**
4. Keep a list of all employees trained in the facility's Stormwater Pollution Prevention binder or computer file.

REVISING THE SOP

These procedures are reviewed once per year and updated as needed.

STANDARD OPERATING PROCEDURE 4: SNOW REMOVAL AND STOCKPILING
HAMPDEN HIGHWAY DEPARTMENT

DESCRIPTION: Procedures for proper snow management in order to prevent or minimize runoff and pollutant loading impacts.

Proper snow management in terms of stockpiling and removal can prevent or minimize runoff and pollutant loading impacts. Snow piles can contain trash, nutrients, sediments, salt, sand, and vehicle pollutants (petroleum, antifreeze, and oil) that can directly be carried into surface waters during snowmelt.

The Town of Hampden provides snow removal for 55 miles of roadways as well as municipal parking lots for buildings including schools.

When necessary, Hampden stockpiles snow in municipally-owned parking lot areas.

TARGETED CONSTITUENTS:

- Salt
- Sediment
- Nutrients
- Trash
- Oil & grease

MassDEP has published Snow Disposal Guidance online with an interactive map to assist with designation of appropriate upland snow disposal sites: https://www.mass.gov/guides/snow-disposal-guidance#snow-disposal-guidance. MassDEP's emergency contact phone number for inquiries and authorizations during declared statewide snow emergency events is **1-888-304-1133**. For non-emergency information about MassDEP's Snow Disposal Guidance, the MassDEP Western Regional Office's phone number is **1-413-755-2214**.

SNOW STOCKPILE SITE SELECTION:

Locate snow stockpile sites adjacent to or on pervious surfaces in upland areas or upland locations on impervious surfaces that have functioning and maintained storm water management systems away from water resources and drinking water wells. At these locations, the snow meltwater can filter in to the soil, leaving behind sand and debris which can be removed in the springtime.

- Only snow from within the Zone II or IWPA should be disposed of within this resource area to limit the potential for pollution of water supplies.
- Avoid dumping of snow into any waterbody, including rivers, reservoirs, ponds, or wetlands.
- Avoid dumping snow in sanitary landfills and gravel pits. Snow meltwater will create more contaminated leachate in landfills posing a greater risk to groundwater, and in gravel pits, there is little opportunity for pollutants to be filtered out of the meltwater because groundwater is close to the land surface.
- Avoid disposing of snow on top of storm drain catch basins or in stormwater drainage swales or ditches. Snow combined with sand and debris may block a storm drainage system, causing localized flooding.

SNOW STOCKPILE SITE PREPARATION AND MAINTENANCE:

- Securely place a silt fence or equivalent barrier on the downgradient side of the snow disposal site.
- To filter pollutants out of the meltwater, wherever possible maintain a 50-foot vegetative buffer strip -during the growth season between the disposal site and adjacent waterbodies.
- Debris should be cleared from the site prior to use for snow disposal.
- Debris should be cleared from the site and properly disposed of at the end of the snow season and no later than May 15.

SNOW PLOWING PROCEDURES

1. As the storm develops and 1-2 inches of snow has accumulated, all of the drivers and available equipment will begin to plow their assigned routes.

2. Prior to plowing operations, equipment will be checked to ensure proper working order. All fluid levels will be checked and filled to proper levels, all lights must be in working order. A visual walk-around inspection of the truck or equipment must be made. Any repairs must be made and reported to a supervisor or mechanic before leaving the yard.

3. Avoid plowing, pushing, blowing or storing excess snow, deicer, or other debris in or near creeks, watercourses or storm drainage systems.

4. Reduce plowing speed in sensitive areas (near creeks, wetlands or other water courses) to prevent snow and deicing materials from entering waterways.

5. Follow the prioritized route or schedule. This schedule is located at the Highway Department at 589 Main Street in Hampden, MA.

6. Before parking any truck or equipment after use, all fluid levels will be checked and filled. Blades or bolts, which need replacing, will be taken care of unless told to do otherwise. Chains that need repairs will be repaired. All minor repairs will be done by the operator. Any repairs the operator cannot perform will be written up on the proper forms and turned in to the Highway Superintendent. The Highway Superintendent will determine importance and will assign the repairs according to schedule.

RECORD KEEPING

A master schedule of prioritized snow plowing routes and the miles or roads plowed is kept at the Highway Department at 589 Main Street in Hampden, MA.

REVISING THE SOP

These procedures are reviewed once per year and updated as needed.

STANDARD OPERATING PROCEDURE 5: CONSTRUCTED STORMWATER BEST MANAGEMENT PRACTICES INSPECTIONS
HAMPDEN HIGHWAY DEPARTMENT

DESCRIPTION: Procedures for inspecting eight common types of constructed stormwater best management practices (BMPs). Constructed BMPs are permanent site features designed to treat stormwater before infiltrating it to the subsurface or discharging it to a surface water body.

This SOP is based on the Massachusetts Stormwater Handbook and is not intended to replace that document. This SOP is also not intended to replace the Stormwater BMP Operation and Maintenance (O&M) Plan required by the Massachusetts Wetlands Protection Act, Order of Conditions. Inspection forms for each BMP are attached.

TARGETED CONSTITUENTS:

- Sediment
- Nutrients
- Trash
- Invasive species

BIORETENTION AREAS AND RAIN GARDENS:

Description

Bioretention areas and rain gardens are shallow depressions filled with sandy soil, topped with a thick layer of mulch and planted with dense native vegetation. There are two types of bioretention cells:

1. Filtering bioretention area: Areas that are designed solely as an organic filter; and
2. Exfiltration bioretention area: Areas that are configured to recharge groundwater in addition to acting as a filter.

Inspection & Maintenance

Regular inspection and maintenance are important to prevent against premature failure of bioretention areas or rain gardens. Regular inspection and maintenance of pretreatment devices and bioretention cells for sediment buildup, structural damage and standing water can extend the life of the soil media.

When failure is discovered, excavate the bioretention area, scarify the bottom and sides, replace the filter fabric and soil, replant vegetation and mulch the surface.

Never store snow within a bioretention area or rain garden. This would prevent required water quality treatment and the recharge of groundwater.

Maintenance Schedule

Activity	Time of Year	Frequency
Inspect for soil erosion and repair	Year round	Monthly
Inspect for invasive species and remove if present	Year round	Monthly
Remove trash	Year round	Monthly
Mulch Void Areas	Spring	Annually
Remove dead vegetation	Fall and Spring	Bi-Annually
Replace dead vegetation	Spring	Annually
Prune	Spring or Fall	Annually
Replace all media and vegetation	Late Spring/Early Summer	As Needed

CONSTRUCTED STORMWATER WETLANDS:

Description

Constructed stormwater wetlands maximize the pollutant removal from stormwater through the use of wetland vegetation uptake, retention and settling. Constructed storm water wetlands must be used in conjunction with other BMPs, such as sediment forebays.

Inspection & Maintenance

Regular inspection and maintenance are important to prevent against premature failure of bioretention areas or rain gardens. Regular inspection and maintenance of pretreatment devices and bioretention cells for sediment buildup, structural damage and standing water can extend the life of the soil media. Never store snow within a constructed stormwater wetland. This would prevent required water quality treatment and the recharge of groundwater.

When failure is discovered, excavate the bioretention area, scarify the bottom and sides, replace the filter fabric and soil, replant vegetation and mulch the surface.

Maintenance Schedule – Years 0—3

Activity	Time of Year	Frequency
Inspect for invasive species and remove if present	Year round	Monthly
Record and Map:	Year round	Annually
Types and distribution of dominant wetland plants	Year round	Bi-Annually
Presence and distribution of planted wetland species	Spring	Annually
Presence and distribution of invasive species	Fall and Spring	Bi-Annually
Indications other species are replacing planted wetland species	Spring	Annually
Percent of standing water that is not vegetated	Spring or Fall	Annually
Replace all media and vegetation	Late Spring/Early Summer	As Needed
Stability of original depth zones and micro-topographic features		
Accumulation of sediment in the forebay and micropool and survival rate of plants		

Maintenance Schedule – Years 4+

Activity	Time of Year	Frequency
Inspect for invasive species and remove if present	Year round	Monthly
Clean forebays	Year round	Annually
Clean sediment in basin/wetland system	Year round	Once every 10 years
Mulch Void Areas	Spring	Annually
Remove dead vegetation	Fall and Spring	Bi-Annually
Replace dead vegetation	Spring	Annually
Prune	Spring or Fall	Annually
Replace all media and vegetation	Late Spring/Early Summer	As Needed

WET BASINS

Description

Wet basins are intended to treat stormwater quality through the removal of sediments and soluble pollutants. A permanent pool of water allows sediments to settle and removes the soluble pollutants, including some metals and nutrients. Additional dry storage is required to control peak discharges during large storm events, and if properly designed and maintained wet basins can add fire protection, wildlife habitat and aesthetic values to a property.

Inspection & Maintenance

To ensure proper operation, wet basin outfalls should be inspected for evidence of clogging or excessive outfall releases. Potential problems to investigate include erosion within the basin and banks, damage to the emergency spillway, tree growth on the embankment, sediment accumulation around the outlet and the emergence of invasive species. Should any of these problems be encountered, perform repairs immediately. An on-site sediment disposal area will reduce sediment removal costs.

Maintenance Schedule

Activity	Time of Year	Frequency
Inspect wet basins	Spring and/or Fall	Annually (Minimum)
Mow upper stage, side slopes, embankment and emergency spillway	Spring through Fall	Bi-Annually (Minimum)
Remove sediment, trash and debris	Spring through Fall	Bi-Annually (Minimum)
Remove sediment from basin	Year round	As required, minimum once every 10 years

EXTENDED DRY DETENTION BASINS:

Description

Extended dry detention basins are designed to control both stormwater quantity and quality. These BMPs are designed to hold stormwater for at least 24 hours, allowing solids to settle and to reduce local and downstream flooding. Pretreatment is required to reduce the potential for overflow clogging. The outflow may be designed as either fixed or adjustable. Additional nutrient removal may be achieved by a micropool or shallow marsh.

Inspection & Maintenance

Annual inspection of extended dry detention basins is required to ensure that the basins are operating properly. Potential problems include: erosion within the basin and banks, tree growth on the embankment, damage to the emergency spillway and sediment accumulation around the outlet. Should any of these problems be encountered, necessary repairs should be made immediately.

Maintenance Schedule

Activity	Time of Year	Frequency
Inspect basins	Spring and Fall	Bi-Annually, and during and after major storms
Examine outlet structure for clogging or high outflow release velocities	Spring and Fall	Bi-Annually
Mow upper stage, side slopes, embankment and emergency spillway	Spring through Fall	Bi-Annually
Remove trash and debris	Spring	Bi-Annually
Remove sediment from basin	Year round	At least once every 5 years

INFILTRATION BASINS

Description

Infiltration basins are designed to contain stormwater quantity and provide groundwater recharge. Pollution prevention and pretreatment are required to ensure that contaminated stormwater is not infiltrated. Infiltration basins reduce local flooding and preserve the natural water balance of the site, however high failure rates often occur due to improper siting, inadequate pretreatment, poor design and lack of maintenance.

Inspection & Maintenance

Regular maintenance is required to prevent clogging, which results in infiltration basin failure. Clogging may be due to upland sediment erosion, excessive soil compaction or low spots.

Inspections should include:

- signs of differential settlement
- cracking
- erosion
- leakage in the embankments
- tree growth on the embankments
- rip-rap condition
- sediment accumulation
- turf health

Maintenance Schedule

Activity	Time of Year	Frequency
Preventative maintenance	Spring and Fall	Bi-Annually
Inspection	Spring and Fall	After every major storm for the first 3 months after construction completion. Bi-annually thereafter and discharges through the high outlet orifice.
Mow/rake buffer area, side slopes and basin bottom	Spring and Fall	Bi-Annually
Remove trash, debris and organic matter	Spring and Fall	Bi-Annually

PROPRIETARY MEDIA FILTERS

Description

Media Filters are designed to reduce total suspended solids and other target pollutants, such as organics, heavy metals or nutrients, which are sorbed onto the filter media, which is contained in a concrete structure. The substrate used as filter media depends on the target pollutants, and may consist of leaf compost, pleated fabric, activated charcoal, perlite, amended sand in combination with perlite, and zeolite. Two types of Media Filters are manufactured: Dry Media Filters, which are designed to dewater within 72 hours; and Wet Media Filters, which maintain a permanent pool of water as part of the treatment system.

Inspection & Maintenance

Maintenance in accordance with the manufacturer's requirements is necessary to ensure stormwater treatment. Inspection or maintenance of the concrete structure may require OSHA confined space training. Dry Media Filters are required to dewater in 72 hours, thus preventing breeding of mosquitos and other insects. Proper maintenance is essential to prevent clogging. Wet Media Filters require tight fitting seals to keep mosquitoes and other insects from entering and breeding in the permanent pools. Required maintenance includes routine inspection and treatment.

Maintenance Schedule

Activity	Time of Year	Frequency
Inspect for standing water, trash, sediment and clogging	Per manufacturer's schedule	Bi-Annually (minimum)
Remove trash and debris	N/A	Each Inspection
Examine to determine if system drains in 72 hours	Spring, after large storm	Annually
Inspect filtering media for clogging	Per manufacturer's schedule	Per manufacturer's schedule

SAND AND ORGANIC FILTERS

Description

Sand and organic filters, also known as filtration basins, are intended for quality control rather than quantity control. These filters improve water quality by removing pollutants through a filtering media and settling pollutants on top of the sand bed and/or in a pretreatment basin. Pretreatment is required to prevent filter media from clogging. Runoff from the filters is typically discharged to another BMP for additional treatment.

Inspection & Maintenance

If properly maintained, sand and organic filters have a long design life. Maintenance requirements include raking the sand and removing sediment, trash and debris from the surface of the BMP. Over time, fine sediments will penetrate deep into the sand requiring replacement of several inches or the entire sand layer. Discolored sand is an indicator of the presence of fine sediments, suggesting that replacement of the sand should be completed.

Maintenance Schedule

Activity	Frequency
Inspect filters and remove debris	After every major storm for the first 3 months after construction completion. Every 6 months thereafter.

DRY WELLS

Description

Dry wells are used to infiltrate uncontaminated runoff. These BMPs should never be used to infiltrate stormwater or runoff that has the potential to be contaminated with sediment and other pollutants. Dry wells provide groundwater recharge and can reduce the size and cost required of downstream BMPs or storm drains. However, they are only applicable in drainage areas of less than one acre and may experience high failure rates due to clogging.

Inspection & Maintenance

Proper dry well function depends on regular inspection. Clogging has the potential to cause high failure rates. The water depth in the observation well should be measured at 24- and 48-hour intervals after a storm and the clearance rate calculated. The clearance rate is calculated by dividing the drop in water level (inches) by the time elapsed (hours).

Maintenance Schedule

Activity	Frequency
Inspect dry wells	After every major storm for the first 3 months after construction completion. Annually thereafter.

STANDARD OPERATING PROCEDURE 5: CONSTRUCTED STORMWATER BEST MANAGEMENT PRACTICES INSPECTIONS
HAMPDEN HIGHWAY DEPARTMENT

TRAINING

Employees are trained once per year on this procedure and the proper operation of stormwater BMPs. Employees are also trained on stormwater pollution prevention, spill and response, and illicit discharge detection and elimination procedures.

RECORD KEEPING

1. Records are kept at the Highway Department at 589 Main Street in Hampden, MA.
2. Records shall include an inventory of municipally-owned stormwater treatment BMPs and inspection forms.

REVISING THE SOP

These procedures are reviewed once per year and updated as needed.

INSPECTION OF BIORETENTION AREAS / RAIN GARDENS

General Information

BMP Description	Bioretention Area / Rain Garden		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Inspect for soil erosion and repair	Monthly	Yes ☐ No ☐	
Inspect for invasive species and remove if present	Monthly	Yes ☐ No ☐	
Remove trash	Monthly	Yes ☐ No ☐	
Mulch void areas	Annually	Yes ☐ No ☐	
Remove dead vegetation	Bi-Annually	Yes ☐ No ☐	
Replace dead vegetation	Annually	Yes ☐ No ☐	
Prune	Annually	Yes ☐ No ☐	
Replace all media and vegetation	As Needed	Yes ☐ No ☐	

INSPECTION OF CONSTRUCTED STORMWATER WETLANDS
Years 0-3 of Operation

General Information

BMP Description	Constructed Stormwater Wetland		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Inspect for invasive species and remove if present	Monthly	Yes ☐ No ☐	
Replace all media and vegetation	As Needed	Yes ☐ No ☐	

In addition, the following information should be recorded and mapped at least once per year:

- Types and distribution of dominant wetland plants
- Presence and distribution of planted wetland species
- Presence and distribution of invasive species
- Indications other species are replacing planted wetland species
- Percent of standing water that is not vegetated
- Replace all media and vegetation
- Stability of original depth zones and micro-topographic features
- Accumulation of sediment in the forebay and micropool and survival rate of plants

INSPECTION OF CONSTRUCTED STORMWATER WETLANDS
Year 4 - Lifetime of Operation

General Information

BMP Description	Constructed Stormwater Wetland		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Inspect for invasive species and remove if present	Monthly	Yes ☐ No ☐	
Clean forebays	Annually	Yes ☐ No ☐	
Clean sediment in basin/wetland system	Once every 10 years	Yes ☐ No ☐	
Mulch void areas	Annually	Yes ☐ No ☐	
Remove dead vegetation	Bi-Annually	Yes ☐ No ☐	
Replace dead vegetation	Annually	Yes ☐ No ☐	
Prune	Annually	Yes ☐ No ☐	
Replace all media and vegetation	As Needed	Yes ☐ No ☐	

INSPECTION OF EXTENDED DRY DETENTION BASINS

Inspections should be conducted bi-annually, and during and after major storm events.

General Information

BMP Description	Extended Dry Detention Basin		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Examine outlet structure for clogging or high outflow release velocities	Bi-Annually	Yes ☐ No ☐	
Mow upper stage, side slopes, embankment and emergency spillway	Bi-Annually	Yes ☐ No ☐	
Remove trash and debris	Bi-Annually	Yes ☐ No ☐	
Remove sediment from basin	At least once every 5 years	Yes ☐ No ☐	

INSPECTION OF PROPRIETARY MEDIA FILTERS

General Information

BMP Description	Media Filter		
BMP Location			
Media Type			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Inspect for standing water, trash, sediment and clogging	Bi-Annually (minimum)	Yes ☐ No ☐	
Remove trash and debris	Each Inspection	Yes ☐ No ☐	
Examine to determine if system drains in 72 hours	Annually	Yes ☐ No ☐	
Inspect filtering media for clogging	Per manufacturer's schedule	Yes ☐ No ☐	

INSPECTION OF SAND AND ORGANIC FILTERS

Inspections should be conducted after every major storm event for the first 3 months following completion, then every 6 months thereafter.

General Information

BMP Description	Sand/Organic Filter		
BMP Location			
Media Type			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Remove sediment, trash, and debris	Every 6 months	Yes ☐ No ☐	
Rake sand	Every 6 months	Yes ☐ No ☐	

INSPECTION OF DRY WELLS

Regular inspections should be conducted after every major storm event for the first 3 months following completion, then annually thereafter.

General Information

BMP Description	Dry Well		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			
Describe condition of dry well at time of inspection			

After a major storm event, the water depth in the observation well should be measured at 24 and 48 hour intervals and the clearance rate calculated.

INSPECTION OF WET BASINS

Inspections should be conducted after every major storm event for the first 3 months following completion, then biannually thereafter.

General Information

BMP Description	Wet Basin		
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			
Describe condition of wet basin at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
Preventative maintenance	Bi-Annually	Yes ☐ No ☐	
Mow/rake buffer area, side slopes and basin bottom	Bi-Annually	Yes ☐ No ☐	
Remove trash, debris and organic matter	Bi-Annually	Yes ☐ No ☐	
Inspect and clean pretreatment devices	Every other month and after every major storm event	Yes ☐ No ☐	

INSPECTION OF OTHER BMP

General Information

BMP Description			
BMP Location			
Inspector's Name			
Date of Inspection		Date of Last Inspection	
Start Time		End Time	
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐			
Describe the weather conditions at time of inspection			

Specific Information

Maintenance Activity	Maintenance Frequency	Is Status of BMP Satisfactory?	Corrective Action Needed
		Yes ☐ No ☐	
		Yes ☐ No ☐	
		Yes ☐ No ☐	
		Yes ☐ No ☐	
		Yes ☐ No ☐	
		Yes ☐ No ☐	
		Yes ☐ No ☐	

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